The official Amstrad Magazine

June 1986

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AMSTRAD COMPUTER USER

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Biggles

Airborne with an Amstrad









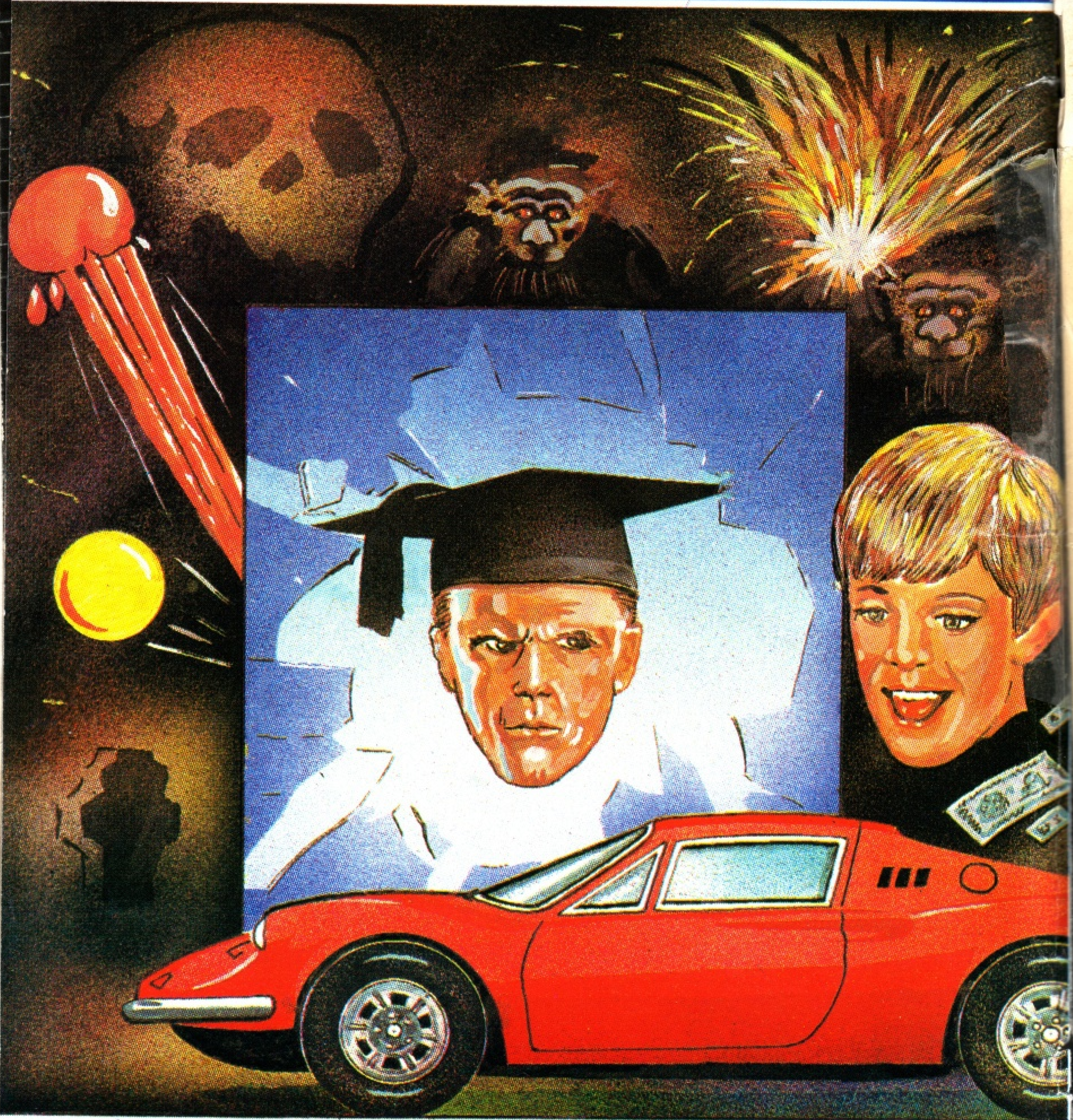


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AMSTRAD COMPUTER USER

The official magazine for users of Amstrad computers

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Amstrad buy-bye Sinclair

Just two years after the launch of the CPC464 Amstrad has bought the rights to manufacture and sell all Sinclair computers and related products for £5m. This earth-shattering news was announced at a press conference in London at the beginning of April.

Sinclair Research Ltd (SRL to its friends), still exists and will continue to develop high technology products. If these include new computers Amstrad can market them under the Sinclair name but SRL would have to use a new name.

There is a lot of research going on at the Metalab, based at Milton Hall in Cambridge. The main computer project is a portable computer code-named Pandora, which was supposed to be both Spectrum-compatible and a CP/M machine. It is quite ironic that SRL was using CPC6128s to develop CP/M software. Unfortunately it looks as though the Pandora will never see the light of day. The flat screen display is rumoured to be difficult to read in 64 and 80 column modes, ruling out true CP/M compatibility.

But SRL does have some very exciting high-tech projects. It is working on a system for wafer scale integration, which works on the premise that making lots of little chips, cutting them up, putting each chip in a little box and then wiring all the boxes together is more difficult and expensive than making the whole computer as one big chip. The drawback with big chips is that they are unreliable – the bigger the chip the more likely it is to be faulty or get damaged in manufacture. Wafer scale integration allows for this by building smart chips, ones which can decide which bits of themselves are faulty and not to be used.

The other major field SRL is working in is that of telecommunications, but it is playing these cards close to its chest. One area could be cellular telephones, although a satellite television project seems more likely.

The deal went through remarkably quickly. Alan Sugar was first approached by Michael Langdon – from Sinclair's accountants – who really orchestrated the deal and then lost out on the glory by going on holiday. For the people involved in the paperwork there were many late nights spent dotting i's and crossing t's in the contract which was finally signed in the early hours of Wednesday April 2.

For its £5m Amstrad gets the rights to all existing Sinclair products. It can also buy the current stock and machines now being manufactured in Britain.

Amstrad is working on a number of changes for the 128k Spectrum aimed at improving its quality and reliability. One of these improvements may be a built-in cassette recorder, although a system bundled with a monitor would be unlikely since this would compete too closely with the CPC464. Perhaps the advent of the Amstrad-produced Spectrum will lead Amstrad to sell monitors on their own.

Spectrums are currently made in the UK and Amstrad says it will continue to use the same manufacturers if the computers can be produced to meet certain demands on price and quality. The experts from MEJ electronics will probably look at ways in which this can be done. Given the work they have done on the CPC and PCW machines we can expect a Spectrum with fewer and bigger chips.

The Sinclair QL is likely to be dropped. Amstrad may experiment with a version using 3in discs but since this machine was part of the reason Sinclair failed it would seem destined for the great computer room in the sky.

Future games machines from Amstrad will carry the Sinclair badge although there is probably nothing under development at the moment. This will allow Amstrad to move upmarket leading to more speculation that the next machine will be a 16 bit one.



Right: The first real Sinclair

Below: The last real Sinclair



Joyce gets a lightpen

An impressive addition to the Electric Studio Products (ESP) range is the PCW8256 lightpen.

The interface for the pen plugs into the back of a Joyce in place of the CPS serial adapter and contains some very clever electronics.

With a peripheral like a lightpen the usefulness of the whole thing depends on how good the software is. ESP has written its own graphic routines for the PCW and has plans to provide these as a graphics extension for Mallard Basic. A newspaper page composition program is also planned, along the lines of AMX Pagemaker.

There is a wide variety of brush and fill types. This allows you to design screens, making the most of the high resolution screen. The pen is pixel accurate, making it easy to use for detailed work.

Adding headings is made simpler by the commands to generate text with different sizes and shapes. This is not strictly a lightpen feature but you can use the pen to round off the corners on the rather chunky text.



ESP lightpen software has extensive graphics routines



Caxton lands a database

A database software language has been found lurking in the United States by Caxton Software.

The package is called Condor and although it is widely used by many large American corporations and Government departments (150,000 units in use) it has remained in the dark, overshadowed by Dbase II.

The language is claimed to have all the facilities of DBase II but will be marketed for less than half the price. One major point claimed in its favour is the extensive use of English (American?) type commands.

At the moment Caxton are putting the finishing touches to their documentation for the package so it shouldn't be too far off the launch pad. The only database system marketed by Caxton at the moment is Cardbox which is necessarily short on features to make sure the software is easy to use and functional.

Condor should fill the gap nicely for those who want more power and are prepared to burn the midnight oil getting the thing to work.

Tasman turns to Joyce

The Spectrum emigrées among you should remember the company Tasman Software and its famous Tasword word processor.

Tasword was about the only decent word processing tool you could get on the poor old Speccy so Tasman did rather well. But the programmers have learnt so much about more serious applications since they started doing application software for Amstrad they are now set to come out and do battle with the big boys of the wordprocessing industry.

Tasword 8000 has been developed specially to take advantage of the features boasted by the Joyce. For just £24.95 you get a full function word processor with a mail-merge facility and the ability to output the results in two completely different fonts.

I look forward to getting my hands on this, for old time's sake.

Be a Viking

Amstrad-using Mums and Dads will be interested to learn of some new educational software available for the CPC computers. Two programs have been released by Fernleaf Educational Software, both history programs.

Fletcher's Castle is a game for eight to twelve year olds involving the building of a castle. Viking England: The Raiders, is a game for children of nine to thirteen years. The object is to plan and execute a raid on a local village. Both games cost £10 plus VAT.

More Amstrad versions of Fernleaf software are planned for the future. For more information contact Fernleaf at Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH. Phone 0474 359037.

Beyond announce new products

Beyond, the software house that brought you Lords of Midnight, has announced some new Amstrad products to be released shortly. Doomdark's Revenge is the sequel to Lords of Midnight where the evil Doomdark attempts to get his own back. (I expect you guessed that from the title.)

Shadowfire is the second new release. This is an icon driven game from Denton Designs. Both games will retail for £9.95.

Amstrad left wondering

With the takeover of Sinclair products, Amstrad have found themselves with a problem. How much of the existing Sinclair Spectrum software is compatible with the Spectrum 128? If you are a software house and you have a Spectrum product please contact Amstrad.

Help wanted

Amstrad users are being called on to help Head-Line Communications which produces the Reel-Time tutorial. Its "Listen with LocoScript" tape has been very successful so it is looking for more things to produce tapes for.

It is preparing courses for Supercalc 2 and for CP/M and Basic. If you know what you want write to J.E. Gatten, Headline Communications, 9 Friar Street, Hereford HR4 0AS.

Will your Joyce be an accessory after the fact?

You have probably read it hundreds of times but the chaps at the data protection office are really serious about this registration business.

If you use your computer to keep records of any description then you must contact bureaucrats to find out if you have to register under the new data protection act.

They have produced a new booklet which is slightly more helpful than the old one. To get a copy of the act and a registration pack telephone 0625 535777.



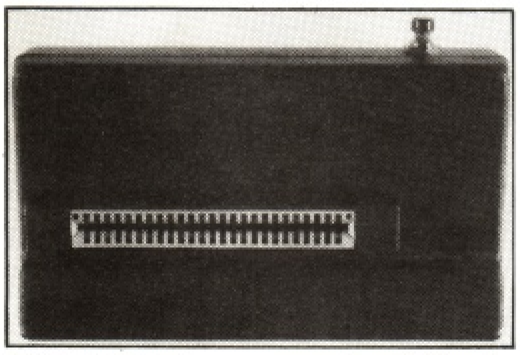
It's a synth

Electromusic Research have been keeping quiet about their Midi interface for the Arnold so Global Software have taken over the marketing. More details from Global Software, PO Box 67, London SW1. Tel: 01-228 1360.

Spitting Image

Despite being illegal the Mirage Imager must be the smartest peripheral ever. It is the answer to every disc owner's dream. The Imager plugs on to the back of a CPC and can take a snapshot copy of the computer's memory and put that on to disc. It can then take the data from the disc and put it back into the computer's memory, leaving it exactly the way it was before you first did the transfer.

This is great for games where you want to save off your position. When you've got nine tenths of the way through Jet Set Willy without losing a life you can press the button and save the game, allowing you to restart from that position at any time in the future.



Mirage Imager . . . smart peripheral

Because the chip which looks after the colours on the Amstrad is quite complicated it is not possible for the Imager to remember which colours the game used. This may mean that you have to play with funny colours.

To make the most of the available disc space the software compacts the program. This has the added advantage that you need an Imager to re-load the software – so if someone else copies a program they can't just send you a disc. To help reduce piracy even further Mirage may add a unique code number to each Imager so that two people with Imagers can't rip programs off.

The Imager will be launched at the Amstrad Show in June and cost around £50. More details from Mirage Microcomputers, 24 Bank Street, Braintree, essex.

Sagesoft Chat on

It seems that congratulations are in order for the Newcastle-on-Tyne software company, Sagesoft.

The Sunday Times and Personal Computer World magazine jointly sponsored a series of software awards and Sagesoft's Chit Chat communications package got first prize in the comms category.

Sagesoft is certainly enjoying the Amstrad market and the signs are that as the machines' popularity continues to increase it will continue to take a large proportion of the business.

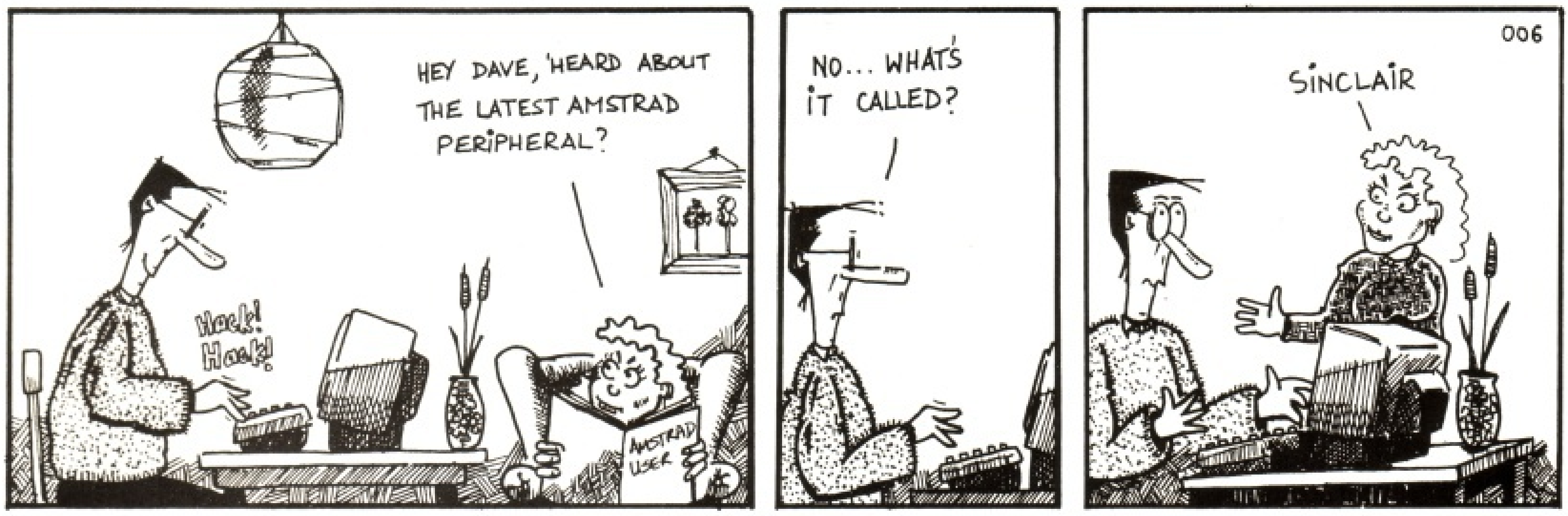
Amstrad Customer Services

Amstrad's Customer Service department is now fully operational. Amstrad have always been willing to help customers although until recently there was only a small department to do it. With the introduction of the PCW 8256, the demand for help from the public led to an expansion of Customer Services.

The old phone system led to many difficulties, people were hanging on waiting to get through to someone who could help them. This meant that they were spending money while waiting to be put through. Amstrad have since installed a new system with no switchboard.

Now every customer service desk has a "key and lamp" system. This allows the customer services people to pick up any of the 20 lines that are ringing. So if it's a real emergency and you do need to ring up, you will eventually get through, and although the phone will ring and ring, at least you're not spending any money. Customer Services are on 0277 230222 (if they're not too busy answering Sinclair enquiries).

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Converts the 464 into a 6128 (except for the ROMS) and gives 128K of memory.

The 64K gives the same amount and configuration of RAM as the 6128.

It is supplied with bank switching software in the form of RSXs to use the second 64K RAM as storage for screens, windows, arrays and variables.

It allows the use of CPM plus as supplied with the 6128.

It requires no additional power supply.

£49.95.

256K Memory Expansion

Converts the 464 into a 6128 (except for the ROMS) and gives a total memory of 320K.

Gives the same memory configuration as the 6128 but there are four extra banks of 64K.

It is supplied with bank switching software in the form of RSXs to use the memory as storage for screens, windows, arrays and variables. The 250K can store 16 full 16K screens.

It allows the use of CPM plus as supplied with the 6128.

It requires no added power supply.

£99.95.

256K Silicon Disc

256K of RAM disc accessible many times faster than the conventional drive and with a greater disc capacity.

It can be logged on as drive B or in a two drive system as drive C.

It will accept all normal Amstrad disc commands i.e. load, save, cat, etc.

Data can be transferred onto the silicon disc from a normal disc or from RAM, application programmes can then work on the data at vastly increased speed.

£99.95.

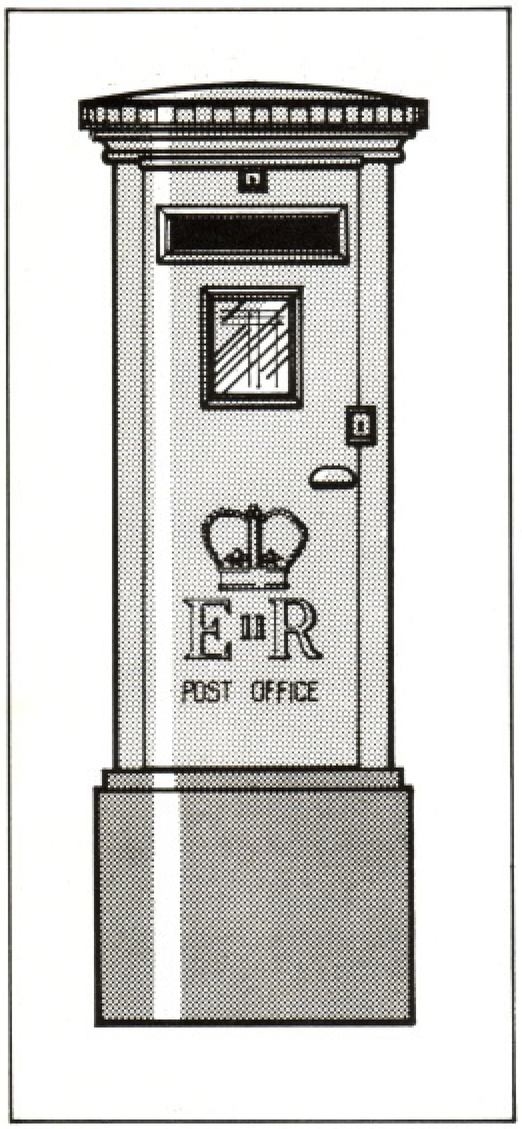
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Write to reply

Please bear in mind that the views expressed herein are not necessarily those of Amstrad or Amsoft. Be assured that all your views are given thorough consideration. This letters section is the Amstrad Computer User's own forum.



Digital Research gets touchy

I found your review of the dk'tronics Ram pack (February 1986) a little unkind in your reference to "those nasty people at Digital Research" not supplying CP/M Plus to purchasers of the Ram pack.

CP/M Plus is freely available from any of our dealers, but as I am sure many of your readers are aware, this is a *(very expensive – Ed)* generic, or uninstalled version.

This has to be the case since the BIOS – the part that configures it for the Amstrad – is the property of Amstrad, not Digital Research.

However there is nothing to prevent an outside company from producing an Amstrad compatible BIOS, and we would expect dk'tronics to do this in order to supply CP/M Plus and thereby provide a full CPC 6128 upgrade.

In the meantime users of the Ram pack ought to be aware that without CP/M Plus it is not a full CPC 6128 upgrade and that any attempt to obtain copies of CP/M Plus from another system is strictly illegal.

I have every sympathy with Ram pack users who find themselves in this unfortunate quandry, but it is incorrect to assume that Digital Research has any responsibility to pick up the pieces left behind by another company's product.

I suspect your readers will feel that if a company decides to embark upon a marketing exercise such as this, then they have a responsibility to provide a full CPC 6128 upgrade, rather than a partial one.

P. Perkins,
Digital Research (UK).

Machine code advice

Since I've bought the Amstrad 6128 and because I'm a very enthusiastic amateur programmer, please could you tell me if there is a firmware manual for the Amstrad 6128. I would be delighted for any information on this.

Also, please would you recommend a machine code programming book for a person who has mastered the basics.

P.N. Ogilvie,
Gwynedd.

ACU: The CPC 6128 firmware manual is an on-going saga. It should be available this month – but the we've all heard that one before. To learn assembler we would recommend the Amstrad assembly language course from Glentop.

Sounds foreign to me

I am writing to you because I do not want to lose any more time fiddling around trying to discover how on earth to get accents to appear in print.

I am a teacher of modern languages and thought that the Amstrad CPC 664 sounded just the right thing for me to type handouts for my students with.

I bought the computer last June and have on various occasions during the summer holidays, the October break, over Christmas, and now again in the Easter break, tried to get accents on to the texts I type in the foreign languages I teach. To no avail.

I am happy with the computer as far as typing in English is concerned. I also find that I can type French, Spanish and German texts beautifully . . . on the screen! They appear correctly, with all the accents, inverted question marks and so on, in place.

But do they transfer on to the printer? No. "Señor" is consistently typed as "seor", so where does the "ñ" go? This is just one example. On the screen everything is perfect, in print it is not.

I therefore continue to put in accents by hand, just as I do when I am using a mere typewriter. This I find utterly frustrating.

So please tell me how I get accents and inverted question/exclamation marks on to the printouts. If I have to buy a French/German/Spanish wordprocessing program to be able to do this, please tell me where I can get them from.

Susanne Lees,
Caithness.

ACU: One of the really great things about Locoscript on the PCW 8256 is its ability to print out a host of foreign characters. Most printers can't – your DMP-1 is certainly not capable of producing any special characters.

Board stiff

After reading various adverts and reviews in your magazine I decided to buy Protext on eprom. I ordered this and a Britannia Software RomPlus to house it.

I asssembled them and switched on. Nothing! Having telephoned Arnor, they agreed to send a replacement eprom but stated that they thought the problem was with the RomPlus. This, they said, did not work with the 6128.

Within a week I had a replacement eprom and this I again fitted in the box. Again it did not work. I then rang Britannia software who said that they had sent me the wrong box. The 6128, they claimed did not like long cables.

I duly returned the RomPlus and waited for a replacement. After a further telephone call this arrived. I had great difficulty fitting the new RomPlus to the 6128 as the cable was too short for comfort, but eventually it was fitted and the eprom in place.

Nothing! In despair I sent the RomPlus back and Britannia refunded the purchase money.

I now had Protext on eprom but no way of running it. I telephoned Arnor and they agreed to upgrade the eprom into an AD2 cartridge for a further £15. I reluctantly agreed to this arrangement and now have Protext working – and working very well – on my 6128.

I was reluctant to go for a cartridge or one of the other romcards at the beginning because I did not like the idea of cards or boxes fitted directly to the back of the computer.

My fears concerning the cartridges are completely justified, for one careless nudge on the back of the machine while

the program is running causes the computer to crash with the loss of any text not saved on disc.

I am far from hapy with the present arrangement and hope some time to find a romcard which functions on the 6128 and is connected via a cable at least 4 inches long.

Peter Misselbrook,
Walthamstow,
London.

ACU: You could try a Rombo board, from Marcus Sharp, 62 Meadowbank, Ladywell, Livingston, West Lothian EH54 6EL, (0506) 39046.

We've got an Arnor board on the office CPC 464, with loads of bits and bobs hanging off the back. This works perfectly – make sure your board is fitted tightly on to the back of the machine.

Computer ham

I am a radio amateur and I'm interested in using my 6128 for sending and receiving RTTY and CW signals.

At present there is no equipment for this purpose currently available in Australia.

I would appreciate hearing from anyone who can give me any information on how to set up an Amstrad 6128 for this purpose and where the necessary programs and hardware can be obtained.

I would also be interested in obtaining information on how to receive other forms of transmission such as Fax and so on.

P.F. Jeffery,
PO Box 34,
Lawson,
Australia.

Arnold abroad

Here is my very first letter to someone other than friends, parents or my bank.

First I must ask you to excuse my undistinguished writing, but my teachers used to say that teaching me proper English was as easy as making stones eat pizza. At least I never had problems doing that.

I have read *ACU* since I moved from Germany to Iceland. Yes, I'm German. Congratulations on your work there in Britain. Best stuff so far.

But there are also some questions I would like to ask. Is it possible for me to join the user club even though I live outside Great Britain and my Arnold is disguised as a Schneider? At least it's got a disc drive with the Amstrad sign as a working companion.

You wouldn't know the Icelandic dealers for *ACU,* would you? My local dealer only gets your magazine every now and then, when he sends for new goodies from Amstrad.

When I use the cheat-the-gang-of-five program from the January issue, I don't get into the plus part because the door won't open. Without cheating I don't even get so far. Any hints?

Andreas Kleine,
Reykavik,
Iceland.

ACU: You can now join the user club from overseas. Foreign subscriptions are available – see the coupon at the back of the magazine.

ACU

REMs

Logo noshow

As a new Amstrad 6128 owner I've just received my second magazine. Why is there nothing at all in it giving so much as a hint about DR Logo?

One of the reasons I opted for Amstrad was because it included this – especially as it is said to be so useful for children to use.

We've had some fun experimenting but there is much less in the user manual about Logo than about Basic – so articles explaining its possibilities are even more necessary. (Gill Ashley Smith, Addlestone, Weybridge, Surrey).

***ACU:* Unfortunately being a Logo user makes you an underpriviledged minority.**

Arrgh, those listings!

Could you please tell me if you check the games you print, because they take hours to load.

And if they don't run it's a waste of time and money buying the magazine. (T. Ginger, Highfield, Hemel Hempstead).

* * *

Could listings be printed on non-glossy paper and in a straightforward format?

Where is the games listing in the April issue? I consider the game as the main event having successfully programmed Splatch, Balloon, Galaxians, Pak Caverns and Racer – all excellent games. In future, could there be some educational game listings and less *ABC.* Our magazine seems to be in the throws of a take over. (B.L. Hanks, Speen, Newbury, Berkshire).

***ACU:* Be assured we do our best to print error free listings – and watch out for more great games in future issues.**

Moan, moan, gripe, gripe

I fully support Iain Sutherland's comments that the manuals for PCW are technically deficient and badly written, and deplore the flippant way in which his legitimate criticisms were answered in this column.

As a recent purchaser of a PCW 8256 I can say that I am delighted with the machine, but resent the frustration caused by the deplorable manuals.

The company should accept these criticisms, voiced by other friends and colleagues who have bought this machine, and do something more than answer them in this dismissive way.

My letter to the company on the subject has failed to elicit any response, and the only help so far received has been from the columns of *Amstrad Computer User.*

I don't mind paying £1 an issue for this periodical, but it smacks of dishonesty for the company to try to persuade a purchaser to buy audio tapes, at nearly £10, in order to understand what should have been made plain in the documentation supplied with the machine. (R. Sweeney, Leeds).

***ACU:* We agree, that for the complete novice, the manuals leave a lot to be desired although no information has been omitted.**

But, while *ACU* works closely with Amstrad providing support for its products, it was us rather than them informing you of the existence of the tutorial tapes (reviewed in March).

More compatibility info

In reference to your Microscope Gallup software chart, I can honestly say that Soul of a Robot (Mastertronic), Hypersports (Imagine), One Man and his Droid (Mastertronic), Who Dares Wins 2 (Alligata) and Computer Hits 10 (Beau Jolly) are all compatible with the Amstrad 6128. (T. Seager, Ottershaw, Chertsey, Surrey).

***ACU:* As you can imagine, compiling the compatibility column of the chart is a real pain. So we are only too pleased to hear from our readers that games are compatible.**

REMs

RECOMMENDED BY THE PROFESSIONALS*

For the Amstrad PCW 8256



48 Hour Dispatch

- DataGem is **the** database for the 8256. **It has been specifically designed and written for the 8256** (it hasn't been 'ported' down from older machines) and makes full use of its special features. Examples are supplied with the software.
- Gemini is one of the longest established and most respected software houses. We've been writing superior software for years, but more than that we offer a continuing service for as long as you need it, not just for a fixed period.
- DataGem is only the first of an exciting new range of serious software for the 8256. This includes Gemini's already legendary cashbook and final accounts packages.
- **Just 48 hours after we've received your instructions DataGem will be dispatched to your door.** Either fill in the coupon and enclose a cheque or, if you're an Access or Amex holder, please call our credit card hotline.
- If DataGem doesn't prove to be value for money, send it back! If you return it complete and undamaged within seven days we'll refund your money with no quibble.

Check that out with the 'competition'

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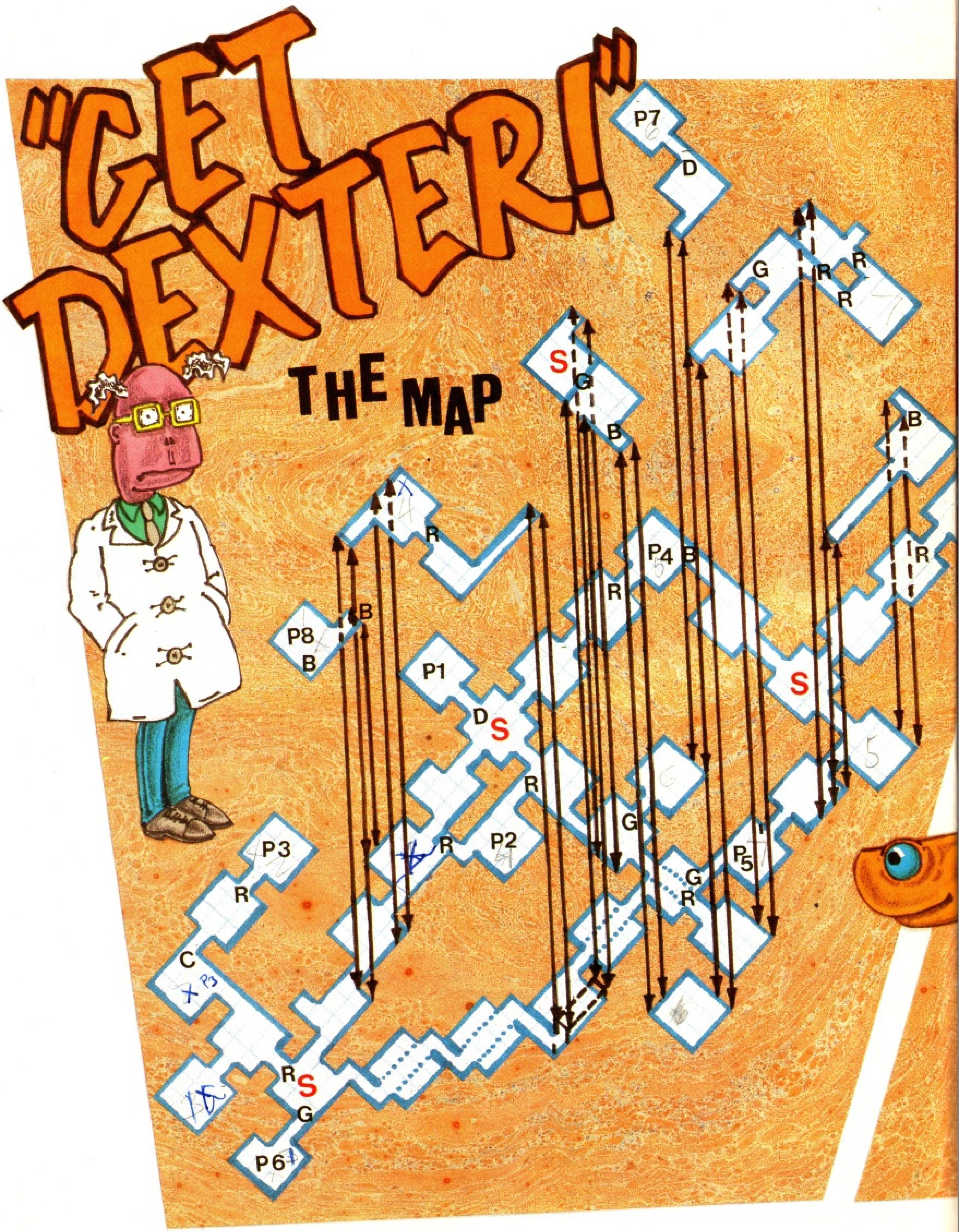
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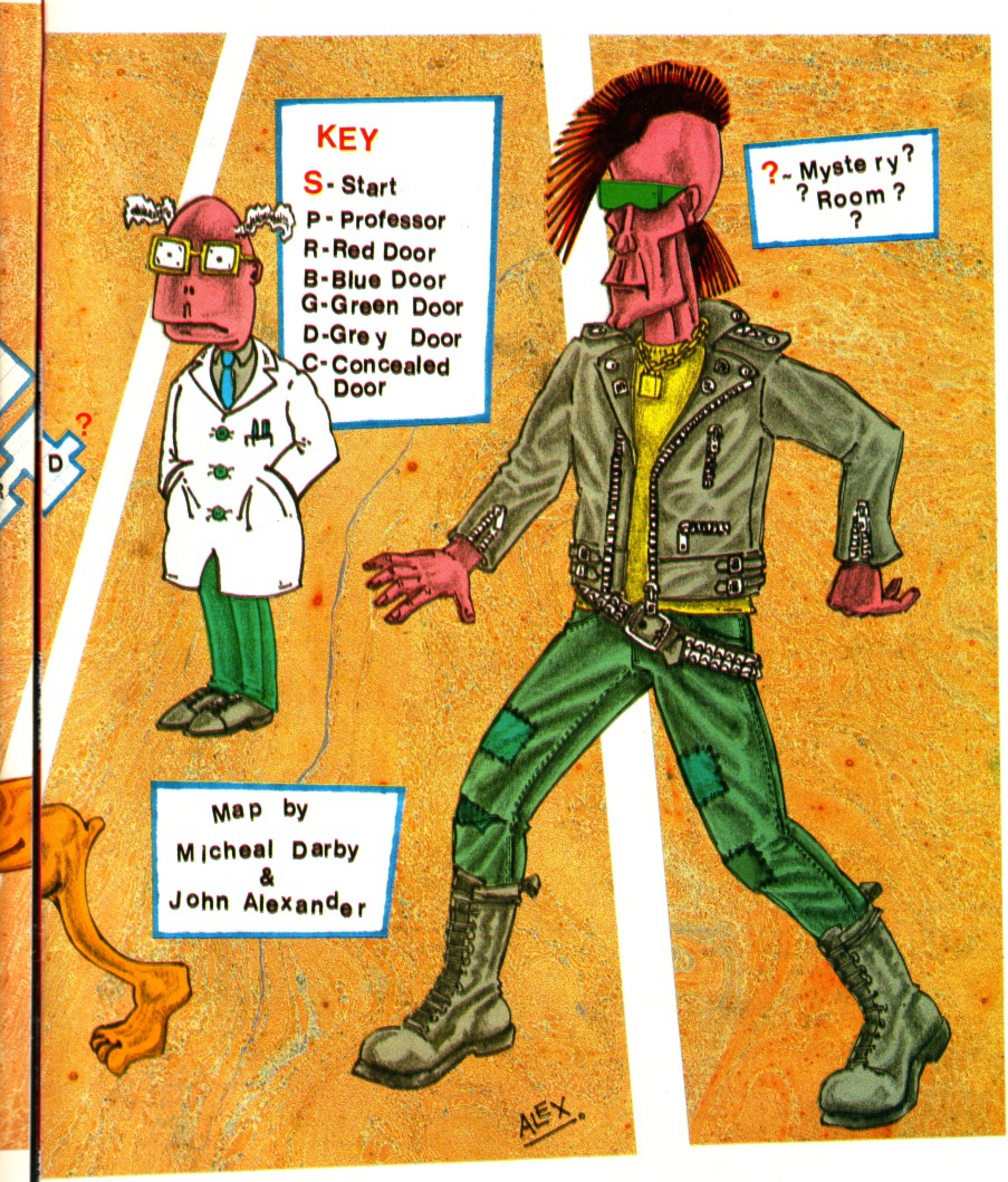
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P2
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R
C
R
S
G
P6


KEY
S - Start
P - Professor
R - Red Door
B - Blue Door
G - Green Door
D - Grey Door
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Micheal Darby
&
John Alexander
ALEX.

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Each pen comes ready to plug directly into your Amstrad (No further interfaces necessary).

The best Light Pen available for the Amstrad.

Music Box

The Electric Studio have commissioned the first light pen controlled Music Package, which is available on cassette or disc and boasts an impressive list of features:

- 464, 664 and 6128 compatible.
- 3 channel polyphonic sound.
- Tone and volume Envelope Designer.*
- Internal storage of approximately 8000 notes.
- Save score and envelopes to tape or disc.
- Use envelopes in own program.
- Any key or time signature.
- Automatic bar line insertion.
- Easy to use Icons with light pen control option.
- Cursor music editor.
- Share memory of channels in any combination.
- Playback: Key transposition: Tempo: Octave.
- Demonstration music included.

* The Envelope Designer uses the light pen to draw the graph of the envelopes — no numbers to enter. Sounds can be played while envelopes are edited.

The package can be controlled by either the ESP or DKtronics light pen; by joystick; or by cursor keys which will help all users get the full benefit from the various functions of the program.

THE PROGRAM WILL WORK WITHOUT A LIGHT PEN AND CAN BE PURCHASED SEPARATELY FOR USE WITH JOYSTICK OR KEYBOARD.

Mouse Graphics

Available only for 6128 owners on disc, this complete graphics package with full ESP specification allows a mouse control device to replace the light pen.

Over 70 functions are included in the software making this the best graphics program currently available for the CPC6128 home computer.

If you already own a mouse this is a program you must buy.

Multi-Text

As a direct result of ESP user requests, the Electric Studio is pleased to announce the release of "Multi-Text".

This package complements the already popular ESP graphics system by providing various text fonts in multiple sizes, which can be added to artwork created with the ESP Light Pen.

• 8 font styles • 4 font sizes • vertical/horizontal text • fill • unfill/erase • copy • cut & paste • save/load to disc/tape • works with green or colour monitors • ESP light pen and screen dump compatible • keyboard option provided.

Running in mode 2, this package is ideal for users wishing to print newsletters, club sheets etc., by using Multi-Text with the ESP art pack.

Supplied on tape with save to disc option and for use on the 464/664/6128 computers.

GSX PEN

6128 owners who have purchased or are considering the purchase of the Digital Research program DR Draw will be delighted by the news of the availability of an ESP Enhancement Pack.

This comprises a pixel accurate light pen with GSX driver on disc, which will allow total control of DR Draw using the light pen instead of cursor key controls.

The cursor is controlled by the light pen which gives almost instant access to all parts of the screen, making menu selection a much speedier process and thus giving additional flexibility to the overall package which is an invaluable time saver for the program user.

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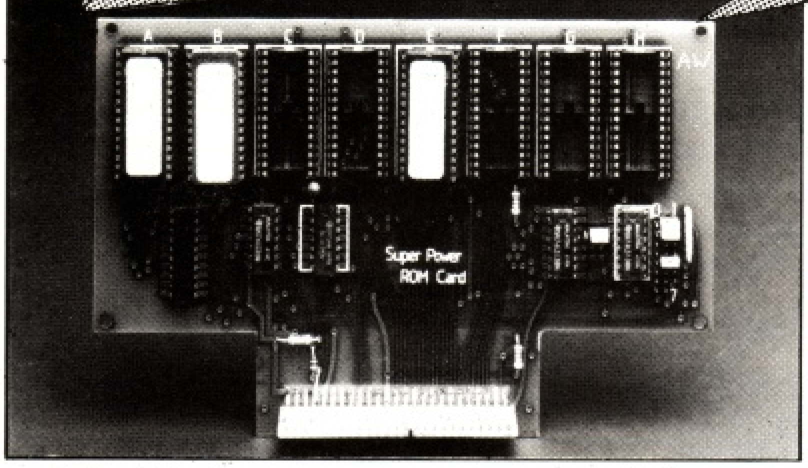
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Over 30 commands in both Assembler and Monitor. Tokenised source code accelerates development time. Assembly at 24000 lines per minute (as many as 8 times faster than competition); large source and object files can be held in memory. Disassembled files can be edited and re-assembled. Comprehensive Monitor with Single-step, conditional breakpoints etc. Rom version held in two 16K chips.

PROGRAMMER'S TOOLBOX & BASIC EXTENSIONS

DIRECT COMMANDS — Character; Compact; Editor; Find; Kill; Medit; Picture; Soundlab; Tidylist; Xref.
PRINTER COMMANDS — Cdump; Dump; Echo.on; Echo.off; Ltron; Ltroff.
GRAPHICS COMMANDS — Circle, Turtle.
(CPC 464 Additional. Fill. Graphics Paper/Graphics Pen. Frame. Mask.)
SCREEN COMMANDS — Double Height; Underline; Normal; Page.on; Page.off; Screen; VDU.
FILE COMMANDS — Baud; Info; Unprotect.
GENERAL COMMANDS — Assemble (simple assembler within Basic); Keyboard; Roms; Tune.

SUPERPOWER DISK USER'S UTILITIES

Program allows detailed inspection and modification of information held on disk and is of particular use for recovering data from corrupted disks. Individual sectors can be read from and written to. All data can be output to the screen and/or printer. Program also contains a number of functions of use to assembly language programmers.

TABULATE DIRECTORY: Displays directory and enters EDIT mode. READ DISK SECTOR: Read sector and enter EDIT mode. LOAD DISK FILE: Load first sector into buffer and remainder to memory for fast access. Enter EDIT mode.

LOAD ROM: Catalogues resident roms, prompts for rom selection and enters EDIT mode. EDIT MEMORY: Displays current buffer. Data displayed is Buffer Address, Hex and ASCII. Comprehensive editing facilities. 'COPY' key gives Intelligent Data Copy. 'TAB' key gives printer output. WRITE: Write sector to disk. DISASSEMBLE: Disassembles code from specified address, giving address, object code, mnemonics and ASCII. Screen and/or Printer output. SEARCH MEMORY: Search sector or a complete file for ASCII string or series of Hex codes. UTILITIES: Includes Format, Hex/Decimal conversions, jump calculations etc. SCREEN UTILITIES. Select from four display modes; choose background and foreground colours.

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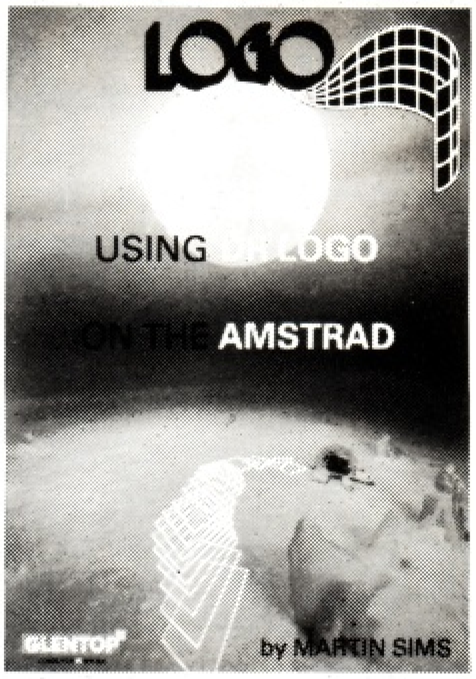
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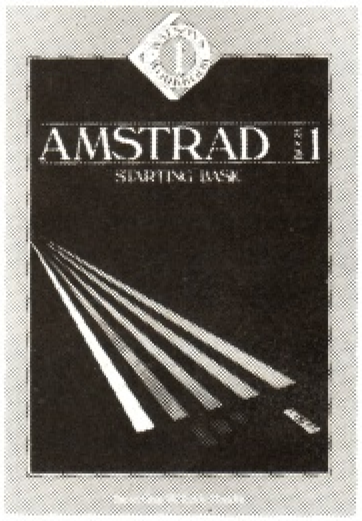
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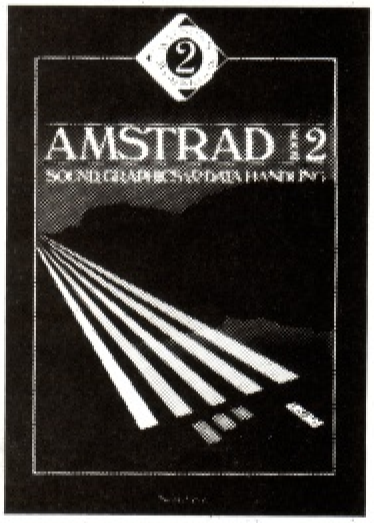
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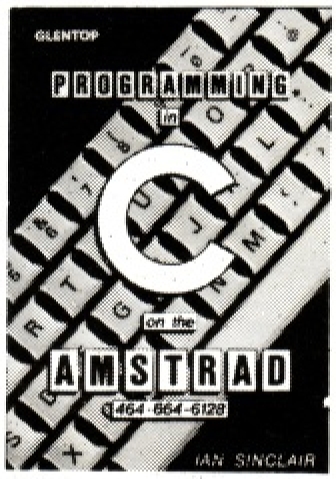
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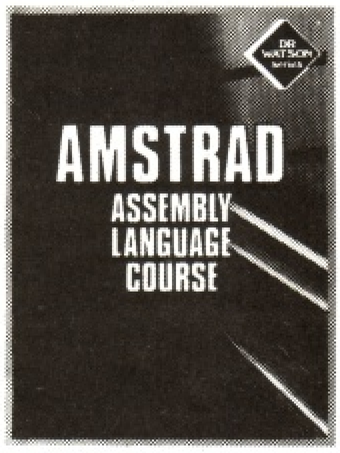
Hisofts "C" on Amstrad Microcomputers.



This book assumes that the reader is familiar with Locomotive BASIC and frequently compares this with 'C'. The author has taken every opportunity to show the reader the new ways of programming available, and has included many reminders about old BASIC habits that must be abandoned.

Because of the close inter-relationship between the way programs are designed and the way they are written, the author links these topics together. The book has been written entirely around the conventional 'top-down' method of structured programming, a method designed to make complex programs relatively easy to write and understand.

This book is suitable for users of the Amstrad CPC464, CPC664, and the CPC6128. **£8.95**



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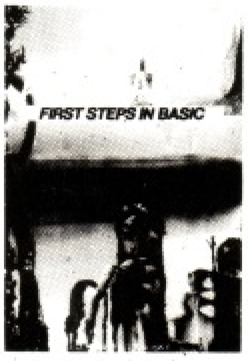
This step-by-step text introduces the complete beginner to Z80 programming. No prior knowledge is assumed and the aim throughout the book is to ensure that the beginner really succeeds. By the end of the book every Z80 class of instruction has been explained in detail. Numerous examples illustrate the points while exercises (along with solutions) test the understanding. Later chapters show how additional commands may be added to BASIC including, for example, a circle drawing routine.

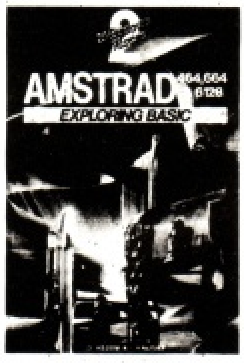
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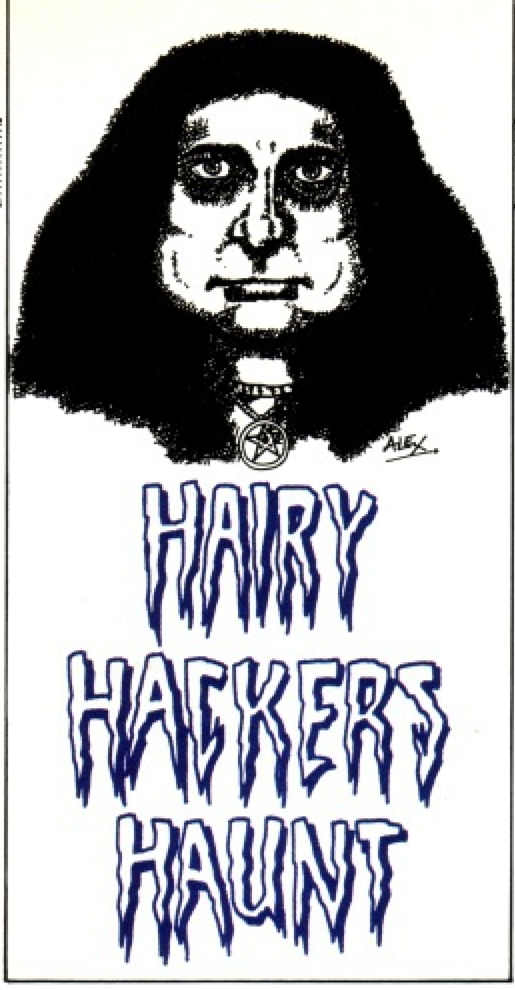
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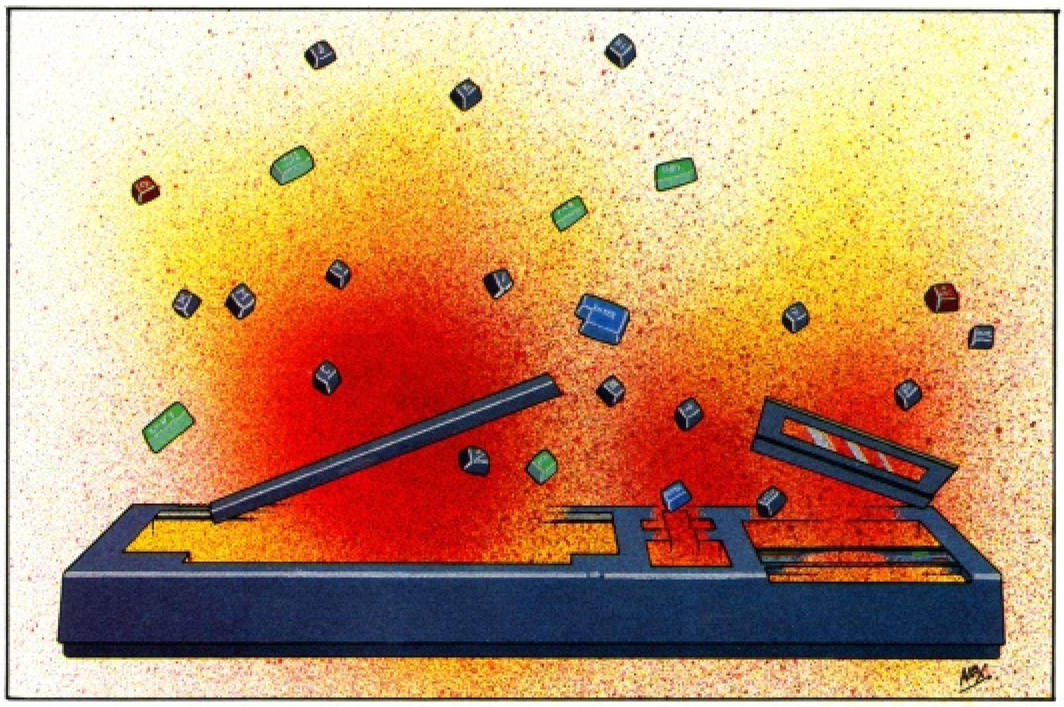
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The hairy hacker is away on his honeymoon so ZZKJ is standing in to present a megahacked version of Elite.

Hands up all those who think you have as much chance of becoming Elite as walking on the ceiling. Thought as much. Put your hands down now – you are going to need them for typing.

After a great deal of head scratching I came up with the following extremely useful programs. They can be used to make your life easier – by giving you more and better weapons – or harder by dumping you in the middle of nowhere with just a military laser and your skill.

The first few extras I picked up from the Cobra Mk III accessory catalogue were reasonably simple – tougher shields and a stronger laser. However once in the mood to soup-up my spacecraft I got carried away and came away with a host of features.

Programmed for power

The first program does the actual hacking. If you use every feature it offers you need to be a very bad shot and a lousy businessman not to get anywhere. It is up to you to use only those features you think will help without making the game too easy.

The second program (in conjunction with the first), enables you to design characters, to create commanders who have everything. You can then load these back into the game and play almost normally, but with extra features such as an infinitely large cargo bay, or military lasers all round. The choice is up to you.

Please note that these programs only work with early versions of Elite. A Metropolitan version will appear next month.

Getting Program 1 going

Type in Program 1 and save it for future use. In the section of program after line 120 and before line 510, you will find lots of lines with a REM statement above the data it belongs with.

To omit a feature described by any particular REM statement, delete the line of data after it. So to choose not to have infinite fuel, leave out the data in line 300.

You may delete as many or as few data lines as you feel necessary but please note that all lines left must be in the same order they originally appeared in, and lines 10-150 and 560 must not be touched.

When you have all the lines you want and are ready to play the game, just run the program and play the tape containing Elite from the start.

Now for an explanation of what each of the different data lines does.

The "No energy loss" and "Infinite missiles" lines speak for themselves. The "Blow up space stations" line requires either the ECM jammer or the cloaking device (which must be switched on – see later).

To blow up a space station, you merely fire a missile at it. To give the space stations a better chance in normal combat the next line means they launch Thargoids instead of Vipers when you shoot at them (without the ECM jammer or cloaking poke of course – with it they don't get the chance).

To put matters firmly back into your hands, the next line installs the patented ZZKJ "Laser boosting system". Or put another way, anything that lasers can normally destroy will be destroyed with one hit from any laser.

Since aiming is sometimes quite difficult and it can take a while before you manage to hit anything, the next line ensures that your lasers stay nice and cool (they even wear sunglasses!).

With all this destruction going on, travelling will become essential and so the next line means you don't need to bother with refuelling stops.

Because 7.0 light years isn't really far enough, the next line lets you hyperspace from any one planet in a galaxy to any other. I recommend the use of infinite fuel with this, otherwise fuel will go to odd levels when you hyperspace. The next line means you can galactic hyperspace as often as you like.

For those who prefer to fight more fairly, the constant escape pod line is for you. This means that you need merely press Esc, and you will always be able to escape to safety. The escape pod has other uses also – see later.

The only problem with escape pods is that you lose all your cargo . . . well not any more. The next line deals with that problem for you and you always arrive safe and sound complete with cargo.

Those who would like to do some trading but find that you can never carry enough cargo will find the next line very useful – a huge cargo bay. The only limit is that you can't have more than 255 units of any one thing.

Back to combat again, with the next line giving what I call "The definition of overkill" – a constant energy bomb. Anytime you get bored with a fight, press Tab and everything on your scanner will be obliterated except for the space stations and Thargoids (but see later).

For those who are epileptics, and for those who don't wish to become one, the next line stops the bright screen flash that normally accompanies the use of an energy bomb.

```
10 '        PROGRAM 1
20 'ELITE HACK PROGRAM ZZKJ 1/4/1986
30 MEMORY &3AFF:MODE 1:BORDER 0
40 INK 0,0:INK 1,24:INK 2,15:INK 3,6
50 WINDOW #1,14,26,12,12:WINDOW #2,14,26
   ,14,14
60 LOAD"!elite1"
70 POKE &3BD1,247:POKE 48,195:POKE 49,0:
   POKE 50,160
80 FOR n=&9FDF TO 1E+09:READ a$:IF a$<>"
   END" THEN POKE n,VAL("&"+a$):NEXT
90 CALL &9FDF,1486
100 DATA A4,5A,5A,4B,4A,21,DF,9F,11,00
110 DATA A0,06,1B,1A,CB,41,28,03,86,18
120 DATA 01,AE,12,1C,10,F3,23,0D,20,EA
130 DATA C3,00,3B,D7,5B,63,56,15,9B,56
140 DATA 6F,84,96,74,CC,8C,BF,A2,54,DC
150 DATA 74,77,F5,BF,23,40,DE,35,41,EA
160 '     *** START OF POKES ***
170 REM NO ENERGY LOSS
180 DATA 32,c1,43
190 REM INFINITE MISSILES
200 DATA 32,14,46
210 REM MISSILES BLOW UP SPACE STATIONS
220 DATA 32,49,94
230 REM SPACE STATIONS LAUNCH THARGOIDS
240 DATA 32,26,93
250 REM ONE HIT TO DESTROY SPACESHIPS
260 DATA 32,a9,87
270 REM NO LASER TEMP RISE
280 DATA 32,51,87
290 REM INFINITE FUEL
300 DATA 32,01,74
310 REM NO HYPERSPACE RANGE LIMIT
320 DATA 32,0d,71,32,17,71
330 REM CONSTANT GALACTIC HYPERSPACE
340 DATA 32,f9,70
350 REM CONSTANT ESCAPE POD
360 DATA 32,2f,46
370 REM NO CARGO LOSS ON ESCAPE
380 DATA 32,4b,46
390 REM INFITE CARGO
400 DATA 32,b3,50
410 REM CONSTANT ENERGY BOMB
420 DATA 32,d7,30
430 REM NO ENERGY BOMB SCREEN FLASH
440 DATA 3e,c9,32,e6,30
450 REM INFINITE CASH
460 DATA 3e,03,32,75,fe,3e,18,32,83,fe
470 REM E.C.M. SYSTEM JAMMER
480 DATA af,32,9e,5a,32,a8,5a,3e,18,32,e
    d,92
490 REM CLOAKING DEVICE
500 DATA 3e,21,32,dd,5a,3e,f6,32,e1,5a,a
    f,32,e3,5a
510 REM INDESTRUCTABILITY
520 DATA 3e,c3,32,2a,13,af,32,81,85,32,6
    0,88
530 REM LOAD ALTERED CHARACTER
540 DATA 3e,1f,32,ed,5c
550 '     *** END OF POKES ***
560 DATA c3,60,00,END
```

Program 1

Spend, spend, spend

"Infinite cash" does what it says, except that instead of stopping your cash going down it merely nullifies the checks on whether you have enough cash. This means that the amount of cash you have will change to odd levels and sometimes it even goes up.

The next line gives you the extremely useful ECM system jammer. If you have an ECM system installed yourself, you can still use it to destroy all missiles on the scanner – see later for details.

The next line gives you the incredible cloaking device. To complete the total impregnability of your ship, the indestructability line means that you can now fly through space stations, planets and suns without getting smashed, crashed or melted.

The only way left to die is to dock with a space station that has been occupied by Thargoids. You can tell this has happened if just about every ship in the vicinity of a planet is a Thargoid. This has nothing to do with the poke to launch Thargoids at you when you shoot the station. If it is properly occupied, you don't even have to shoot anything to get results, so don't dock!

The penultimate line is for use in conjunction with characters produced using the character designer. Basically, you need this line if you want to load characters you have made using the designer. This stops the data being scrambled when it is loaded, and made things easier for me to write the designer program.

The last line is very necessary, so don't miss it out or you won't get far.

Designs on a new character

The program's input is based on a one line window at the bottom of the screen. In here you will see all your currently available options. Initially you will see the main menu. You can alter the character, alter its cargo, alter the space station's cargo, and save the character.

To select an option press the number key corresponding to it. When you are in one of the main menu's first three sections, you move through the different entries by using the up and down arrow keys, and the arrow on the screen points to the selected entry.

For those who require text or numeric input – cargo, cash, missiles, and so on – you will need to press Enter before typing in the number or text. To enter zero for a number, just press Enter.

For all numeric inputs (except for cash), the maximum value you can type in is 255. For cash, the maximum value is 65535999.9 credits but don't enter that because if you then get any more credits the amount will overflow and you will end up with nothing. To get back to the main menu just press "." or Copy (as long as you're not typing in text or a number).

When altering the space station's cargo, you will notice that you can't alter the number of alien items it has for sale.

This is because space stations never sell Tharglets and the game resets the number that they have available to zero.

To save the character, or reset back to the normal Commander Jameson, use option 4 when you will get another sub-menu. To load characters back into the game you need to use the hacking program with the "Load altered character" line present.

If you then save the character straight back out of the game you can in future load it back in without using the pokes. In fact the character is completely portable and can be used on any copy of Elite – including the one in your local WH Smiths.

Remember that if this line has been used, you can't load in characters that you have saved normally, and this poke is really just to allow you to load the altered characters you design with the designer program. One word of advice – don't have a large number of missiles since the game messes up its display because it just can't cope.

Hints 'n' tips

The first two are things I've been told. I haven't played long enough to find out if they are true, but I discovered the relevant pieces of equipment after being told about them.

First is the ECM system jammer. this is apparently given to you by the federation to complete your first mission, which is to blow up the space station at Tibedied which has been occupied by Thargoids.

What it does is to stop enemies using their ECM systems on your missiles, so they can't stop them. I don't know how you are legally supposed to be given the ECM jammer – a large number of Right on Commanders I suppose – so just use the pokes in the hacking program.

Second is the cloaking device. This can be obtained when you galactic hyperspace to galaxy 2. When you arrive, you will be greeted by a group of Asps, one of which will keep disappearing and reappearing.

When you kill this one (normally that should read "if") and you pick up its cargo pod, you will find that it contains the cloaking device, which immediately installs itself. (Oh the wonders of alien technology!).

The cloaking device is activated or de-activated by the Y key. When it is on your screen's border and your indicators will go blue and your energy will start going down at speed – unless you use the never lose energy poke.

The device makes you and your missiles totally invisible (strange, you can still see them). You aren't shot at, and your missiles aren't ECM'd.

```
10 '            Program 2
20 REM ELITE Character designer by  ZZKJ
    1/4/1986. For ACU
30 DEF FN p(x)=PEEK(dat+x):MEMORY 29999:
    dat=32768:mcode=30000:wtk=&BB06
40 BORDER 0:GOSUB 1450:INK 0,1:INK 1,20:
    INK 2,15,25:INK 3,14:PEN #1,1
50 x$=CHR$(224)+".":c$=CHR$(18):e$="Pres
    s ENTER to change "
60 b$=CHR$(242)+CHR$(154)+CHR$(154):r$=C
    HR$(154)+CHR$(154)+CHR$(243)
70 LOCATE 6,2:PEN 2:PRINT"E L I T E  Cha
    racter Designer":PEN 1
80 LOCATE 4,12:PRINT"Written by ZZKJ for
    ACU, 1/4/1986"
90 FOR n=mcode TO mcode+10:READ a:POKE n
    ,a:NEXT
100 ad=dat:READ a:WHILE a<900:IF a THEN
    POKE ad,a:ad=ad+1:GOTO 120
110 READ a:FOR ad=ad TO ad+a:POKE ad,0:N
    EXT
120 READ a:WEND:n$="JAMESON":spec=0
130 DIM e$(9):FOR n=1 TO 9:READ e$(n):NE
    XT
140 DIM r$(9):FOR n=1 TO 9:READ r$(n):NE
    XT
150 DIM p$(4):FOR n=1 TO 4:READ p$(n):NE
    XT
160 DIM l$(4):FOR n=1 TO 4:READ l$(n):NE
    XT
170 DIM c$(17):FOR n=1 TO 17:READ c$(n):
    NEXT
180 REM main option loop
190 POKE dat+92,spec:PRINT#1,"1=Characte
    r, 2=Cargo, 3=Station, 4=Save"
200 k$="":WHILE k$="":k$=INKEY$:WEND:IF
    INSTR("1234",k$)=0 THEN 200
210 ex=0:ON ASC(k$)-48 GOSUB 220,1110,12
    90,1320:GOTO 190
220 REM Alter Character
230 GOSUB 1450:INK 0,1:INK 1,20:INK 2,15
    :INK 3,14:par=1:parm=22:spec=FNp(92)
240 LOCATE 7,2:PEN 2:GOSUB 1480:PEN 1
250 LOCATE 1,4:PRINT"Galaxy: ";FNp(17)+1
    ;
260 PRINT"    Fuel: ";USING "##.#";FNp(4
    6)/10;:PRINT" Light Years"
270 n=FNp(20)+256*FNp(21)+10000*FNp(18)+
    2560000*FNp(19)
280 PRINT"Cash: ";USING "#########.#";n/
    10;:PRINT" Cr"
290 PRINT"Legal Status: ":n%=FNp(11):GOS
    UB 1500
300 PRINT"Rating: ";:n=FNp(14):IF n THEN
     330
310 n=FNp(13)-1:IF n<8 THEN n=7
320 PRINT r$(LEN(BIN$(n))-2):GOTO 370
330 IF n<3 THEN PRINT r$(6):GOTO 370
340 IF n<11 THEN PRINT r$(7):GOTO 370
350 IF n<26 THEN PRINT r$(8):GOTO 370
360 PRINT r$(9)
370 PRINT"EQUIPMENT:":PRINT TAB(5);"Numb
    er of Missiles: ";USING "###";FNp(47
    )
380 FOR n=1 TO 9:PRINT TAB(5);e$(n):NEXT
390 FOR n=1 TO 4:PRINT TAB(5);:p=FNp(40+
    n):IF p=0 THEN PRINT"No ";
400 PRINT p$(n);:IF p THEN PRINT l$(p);
410 PRINT"Laser":NEXT
420 PRINT TAB(5);"Cloaking Device";TAB(2
    7);:p=spec AND 64:GOSUB 1720
430 LOCATE 27,10:p=FNp(48):GOSUB 1720:p=
    FNp(49):GOSUB 1720
440 p=spec AND 128:GOSUB 1720
450 FOR n=1 TO 6:p=FNp(51+n):GOSUB 1720:
    NEXT
460 WHILE (ex=0):IF par>7 THEN 480
470 ON par GOSUB 520,560,690,720,760,820
    ,860:GOTO 510
480 yps=par+1:LOCATE 1,yps:PEN 2:PRINT r
    $:PEN 1
490 ON par-7 GOSUB 920,960,970,980,1010,
    1010,1010,1010,1010,1010,1030,1030,1
    030,1030,1080
500 LOCATE 1,yps:PRINT"   "
510 WEND:RETURN
520 PRINT#1,"1=COMMANDER, 2=ARCHANGEL":i
    n$="12":PEN 2:LOCATE 1,2:PRINT r$
530 GOSUB 1550:IF k$="" THEN PEN 1:LOCAT
    E 1,2:PRINT"   ":RETURN
540 IF k$="1" THEN spec=spec AND 247 ELS
    E spec=spec OR 8
550 LOCATE 7,2:GOSUB 1480:GOTO 530
560 PRINT#1,e$;"character's name":in$=CH
    R$(13):yps=2:GOSUB 1530:PEN 2
570 GOSUB 1550:IF k$="" THEN PEN 1:GOTO
    1540
580 WINDOW SWAP 0,1:PRINT"Type in new na
    me: ";:n$="":n=0:CALL &BB81
590 k$="":WHILE k$="":k$=UPPER$(INKEY$):
    WEND
600 IF ASC(k$)=13 THEN CALL &BB84:GOTO 6
    70
610 IF ASC(k$)=127 AND n>0 THEN n=n-1:n$
    =LEFT$(n$,n):PRINT CHR$(8);CHR$(16);
620 IF n=10 THEN 590
630 IF k$<>" " AND k$<"0" THEN 590
640 IF k$>"9" AND k$<"A" THEN 590
650 IF k$>"Z" THEN 590
660 n$=n$+k$:n=n+1:PRINT k$;:GOTO 590
670 WINDOW SWAP 0,1:LOCATE 17,2:PRINT n$
    ;c$
680 FOR n=1 TO n:POKE dat-1+n,ASC(MID$(n
    $,n,1)):NEXT:POKE dat-1+n,0:GOTO 560
690 PRINT#1,"Press galaxy number 1-8":LO
    CATE 12,4:PEN 2:PRINT b$:PEN 1
700 in$="12345678":GOSUB 1550:IF k$="" T
    HEN LOCATE 12,4:PRINT"   ":RETURN
710 LOCATE 10,4:PRINT k$:POKE dat+17,ASC
    (k$)-49:GOTO 700
720 PRINT#1,e$;"fuel":in$=CHR$(13):LOCAT
    E 12,4:PEN 2:PRINT r$:PEN 1
730 GOSUB 1550:IF k$="" THEN :LOCATE 12,
    4:PRINT"   ":RETURN
740 PRINT#1,"Enter 10 times fuel (0-25.5
    ): ";:GOSUB 1630
750 LOCATE 22,4:PRINT USING "##.#";n%/10
    :POKE dat+46,n%:GOTO 720
760 PRINT#1,e$;"cash":yps=5:GOSUB 1530
770 in$=CHR$(13):GOSUB 1550:IF k$="" THE
    N GOTO 1540
780 INPUT #1,"Type in cash in credits: "
    ;n:n=n*10:IF n>655359999 THEN 780
790 nh=INT(n/10000):nl=n-nh*10000:n1=INT
    (nh/256):n2=nh-256*n1:n3=INT(nl/256)
800 n4=nl-256*n3:POKE dat+19,n1:POKE dat
    +18,n2:POKE dat+21,n3:POKE dat+20,n4
810 LOCATE 7,5:PRINT USING"#########.#";
    n/10;:PRINT" Cr":GOTO 760
820 PRINT#1,e$;"Legal Status":yps=6:GOSU
    B 1530
830 in$=CHR$(13):GOSUB 1550:IF k$="" THE
    N GOTO 1540
840 PRINT#1,"0=Clean 1-49=Offender 50+=F
    ugitive: ";:GOSUB 1630
850 POKE dat+11,n%:GOSUB 1500:GOTO 820
860 PRINT#1,"Press Rating number 1-9":in
    $="123456789":yps=7
870 GOSUB 1530:GOSUB 1550:IF k$="" THEN
    GOTO 1540
880 LOCATE 9,7:POKE dat+13,0:POKE dat+14
    ,0:p=ASC(k$)-47:PRINT r$(p-1);c$
890 IF p=1 THEN 870 ELSE IF p<8 THEN POK
```

Program 2: Elite character designer

Lost in time . . . lost in space

Now for some information on Witch space. This is what you get stuck in when a hyperspace jump is stopped half way.

It's easy to recognise because the first thing you see is three or four Thargoids coming at you with their lasers going as if there were no tomorrow.

Unless you're lucky – or cheat – your character won't see the rest of today – let alone tomorrow. In Witch space you can't dock, use escape capsules, or use energy bombs (because Thargoids are immune to them – but wait and see . . .).

To get into Witch space, pause the game, press F – you should hear a beep – un-pause the game, and hyperspace somewhere. You will find that you have materialised mid-way between your start and destination, and now confront the aforementioned Thargoids.

To get out of Witch space use the same procedure, as any further hyperspace jumps without pressing F will otherwise take you to another part of Witch space. This can be fun if you like Thargoid bashing, but not so much fun if you just want to get the hell out of there.

There is an interesting bug in the game. If you fire a missile at a Thargoid, or anything else nearby, using the ECM system jammer or cloaking device, and use an energy bomb, you will destroy one of the Thargoids nearby, and further energy bombs will each destroy another Thargoid. When there are no more Thargoids left, the next energy bomb will destroy everything else.

Leader with the lamp

Another interesting thing is that if you destroy a space station and then dock in galaxies 2-8, you are awarded the order of The Angels of Mercy, and your name

```
E dat+13,2↑p+1:GOTO 870
900 IF p<10 THEN POKE dat+14,3+(p-8)*8 E
    LSE POKE dat+14,26
910 GOTO 870
920 PRINT#1,e$;"number of missiles";:in$
    =CHR$(13):GOSUB 1550
930 IF k$="" THEN RETURN
940 PRINT#1,"Enter number of missiles (0
    -255): ";:GOSUB 1630
950 LOCATE 25,9:PRINT USING "###";n%:POK
    E dat+47,n%:GOTO 920
960 ofs=48:GOTO 1020
970 GOSUB 1730:IF k$="" THEN RETURN ELSE
    POKE dat+49,127*p:GOTO 970
980 GOSUB 1730:IF k$="" THEN RETURN
990 IF p THEN spec=spec OR 128 ELSE spec
    =spec AND 127
1000 GOTO 980
1010 ofs=par-12+52
1020 GOSUB 1730:IF k$="" THEN RETURN:ELS
    E POKE dat+ofs,255*p:GOTO 1020
1030 PRINT#1,"Press ";p$(par-17);"Laser
    type (0-4):":in$="01234"
1040 GOSUB 1550:IF k$="" THEN RETURN
1050 p=ASC(k$)-48:POKE dat+par+23,p:LOCA
    TE 5,yps:IF p=0 THEN PRINT"No ";
1060 PRINT p$(par-17);:IF p THEN PRINT l
    $(p);
1070 PRINT"Laser";c$:GOTO 1040
1080 GOSUB 1730:IF k$="" THEN RETURN
1090 IF p THEN spec=spec OR 64 ELSE spec
    =spec AND 191
1100 GOTO 1080
1110 REM Alter your cargo
1120 GOSUB 1450:INK 0,4:INK 1,19:INK 2,2
    6:INK 3,14:LOCATE 5,2
```

```
1130 ofs=22:PEN 2:GOSUB 1480
1140 PRINT"'S CARGO":par=1:opr=1:parm=17
    +(ofs>22)
1150 PEN 1:LOCATE 5,4:PRINT"PRODUCT
    QUANTITY":PRINT
1160 FOR n=1 TO parm:PRINT TAB(5);c$(n);
    TAB(20);USING"###";FNp(ofs+n):NEXT
1170 IF parm=16 THEN 1190 ELSE parm=18
1180 PRINT"    Refugees     ";:p=spec AN
    D 32:GOSUB 1760
1190 LOCATE 1,5+opr:PRINT "   ":IF ex TH
    EN RETURN
1200 opr=par:LOCATE 1,5+par:PEN 2:PRINT
    r$:PEN 1
1210 IF par=18 THEN 1250
1220 PRINT#1,e$;c$(par):in$=CHR$(13):GOS
    UB 1550:IF k$="" THEN 1190
1230 PRINT#1,"Type in quantity of ";c$(p
    ar);": ";:GOSUB 1630
1240 POKE dat+ofs+par,n%:LOCATE 20,5+par
    :PRINT USING"###";n%:GOTO 1220
1250 PRINT#1,"Refugees: 1=Present, 0=Not
    Present":in$="10"
1260 GOSUB 1550:IF k$="" THEN 1190 ELSE
    LOCATE 18,23:p=ASC(k$)-48
1270 IF p THEN spec=spec OR 32 ELSE spec
    =spec AND 223
1280 GOSUB 1760:GOTO 1260
1290 GOSUB 1450:INK 0,9:INK 1,25:INK 2,2
    4:INK 3,18:ofs=73:LOCATE 5,2:PEN 2
1300 PRINT"SPACE STATION";:GOTO 1140
1310 REM Save Commander
1320 GOSUB 1450:INK 0,3:INK 1,25:INK 2,6
    :INK 3,26:LOCATE 9,2:PEN 2
1330 PRINT"ACCESS MENU":PEN 1:LOCATE 4,7
1340 PRINT"1 Reset to initial JAMESON data"
1350 LOCATE 4,9:PRINT"2 Save ";:GOSUB 14
    80
1360 LOCATE 4,11:PRINT"3 Exit to designe
    r main menu"
1370 k$="":WHILE k$="":k$=INKEY$:WEND:IF
    INSTR("123"+x$,k$)=0 THEN 1370
1380 IF k$="1" THEN RUN
1390 IF k$<>"2" THEN RETURN
1400 PRINT#1,"Start tape, then press a k
    ey":CALL wtk:INK 0,9:INK 1,19:INK 2
    ,22
1410 crc=0:sum=0:FOR n=0 TO 101:crc=crc
    XOR FNp(n):sum=sum+FNp(n):NEXT
1420 sum=(sum+crc) AND 255:POKE dat+102,
    crc:POKE dat+103,sum
1430 CALL mcode:INK 0,3:INK 1,25:INK 2,6
    :WINDOW SWAP 0,1:GOSUB 1480
1440 PRINT" Saved. Press a key":CALL wtk
```

```
    :CLS:WINDOW SWAP 0,1:GOTO 1370
1450 MODE 1:WINDOW 2,39,1,24:WINDOW #1,1
    ,40,25,25:ZONE 19
1460 PLOT 0,16,3:DRAWR 639,0:DRAWR 0,383
    :DRAWR -639,0:DRAWR 0,-383
1470 MOVE 0,360:DRAWR 639,0:RETURN
1480 IF spec AND 8 THEN PRINT"ARCHANGEL
    "; ELSE PRINT"COMMANDER ";
1490 PRINT n$;:RETURN
1500 LOCATE 15,6:IF n%=0 THEN PRINT"Clea
    n     ":RETURN
1510 IF n%<50 THEN PRINT"Offender" ELSE
    PRINT"Fugitive"
1520 RETURN
1530 PEN 2:LOCATE 30,yps:PRINT b$:PEN 1:
    RETURN
1540 LOCATE 30,yps:PRINT "   ":RETURN
1550 k$="":WHILE k$="":k$=INKEY$:WEND
1560 IF ASC(k$)=240 THEN par=par-1:GOTO
    1600
1570 IF ASC(k$)=241 THEN par=par+1:GOTO
    1610
1580 IF INSTR(x$,k$) THEN ex=1:GOTO 1620
1590 IF INSTR(in$,k$) THEN RETURN ELSE 1
    550
1600 IF par<1 THEN par=parm
1610 IF par>parm THEN par=1
1620 k$="":RETURN
1630 n%=0:WINDOW SWAP 0,1:CALL &BB81
1640 k$="":WHILE k$="":k$=INKEY$:WEND
1650 IF ASC(k$)=13 THEN CALL &BB84:WINDO
    W SWAP 0,1:RETURN
1660 IF ASC(k$)=127 AND n% THEN n%=INT(n
    %/10):PRINT CHR$(8);CHR$(16);
1670 IF k$<"0" OR k$>"9" THEN 1640
1680 IF n%>25 THEN 1640
1690 IF n%=25 AND k$>"5" THEN 1640
1700 n%=10*n%+ASC(k$)-48:IF n% THEN PRIN
    T k$;
1710 GOTO 1640
1720 GOSUB 1760:LOCATE 27,VPOS(#0):RETUR
    N
1730 PRINT#1,"1=Present, 0=Not Present":
    in$="10":GOSUB 1550
1740 IF k$="" THEN RETURN
1750 LOCATE 27,yps:p=ASC(k$)-48
1760 IF p THEN PRINT"Present     " ELSE P
    RINT"Not Present"
1770 RETURN
1780 DATA 33,0,128,17,104,0,62,22,195,15
    8,188
1790 DATA 74,65,77,69,83,79,78,0,12,232,
    3,0,17,20,1,0,3,70,3,0,11,74,90,72,
    2,83
1800 DATA 183,56,173,156,20,29,21,5,3,17
    ,18,26,14,39,8,0,1,10,25,0,1,61,14,
    17
1810 DATA 12,0,2,39,8,1,42,77,143,242,13
    6,5,999
1820 DATA "Large Cargo Bay","E.C.M. Syst
    em","E.C.M. System Jammer","Fuel Sc
    oops"
1830 DATA "Escape Pod","Energy Bomb","En
    ergy Unit","Docking Computers"
1840 DATA "Galactic Hyperspace"
1850 DATA "Harmless","Mostly Harmless","
    Poor","Average","Above Average"
1860 DATA "Competent","Dangerous","Deadl
    y","---- E L I T E ----"
1870 DATA "Front ","Rear ","Left ","Righ
    t "
1880 DATA "Pulse ","Beam ","Military ","
    Mining "
1890 DATA "Food","Textiles","Radioactive
    s","Slaves","Liquor/Wines","Luxurie
    s"
1900 DATA "Narcotics","Computers","Machi
    nery","Alloys","Firearms","Furs"
1910 DATA "Minerals","Gold","Platinum","
    Gem-Stones","Alien Items"
```

changes from Commander XXXX to Archangel Florence.

You can change your name back to anything you wish, but the title Archangel stays. Which is why I have incorporated this feature into the character designer, in case you were wondering about my sanity.

There is one thing to be careful about when blowing up space stations. If you blow one up and fly to where it used to be, the game crashes – you have been warned!

You should hyperspace away, or use an escape pod to dock with it, because your docking computer won't be able to handle docking with a nonexistant space station. It doesn't seen to stop the escape pod working though.

A very underrated bit of equipment is the poor little escape pod. Not only does it save you from fights, and dock you with destroyed space stations, but it is also useful if you don't want to fly all the way to a space station, because it will dock you with your local space station no matter how far away from the planet you are.

It is also useful in that it resets your legal status back to clean every time you use it.

However if you are still carrying an illegal cargo your status will go straight back up again. Of course you know you have got an escape pod fitted because your indicators change from red to orange, although this may not happen if you use the pokes.

You will find that some of the pokes to give you features such as infinite energy bombs don't appear on your inventory, but they are still there.

So, that's all there is to it, but before I go, there's just one more thing left to say "Right on, Archangel".

ACU

MicroLink



What it offers the Amstrad user . . .

Electronic mail is much cheaper than the post

Sending mailbox messages to other subscribers, whose numbers are rapidly growing, is the cheapest form of communication possible. You can send a message of any length to another mailbox for less than the cost of a first-class stamp. And it doesn't cost a penny more to send the same message to 500 different mailboxes! Even a message sent to a mailbox on the other side of the world only costs 30p.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe.

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are . . . home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

We're only a local phone call away

The majority of MicroLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for direct access via MicroLink to all the other countries belonging to the international Dialcom system.

Telemessages – at a third off

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, which costs £3.50 for 50 words. But you can now use it via MicroLink, for only £1.25 for up to 350 words! For an extra 65p your message can be delivered in an attractive greetings card.

Go teleshopping on your micro

With MicroLink you can study the British Rail timetable – and then buy your ticket in advance. You can book theatre tickets. And even order a bouquet of flowers. It's all part of the teleshopping revolution!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 11p a minute during office hours. There is an additional 2.5p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, telemessages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 11p per minute or part – standard rate.
Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.
Applicable for storage of information, such as telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.
Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).
Only applies to users outside the 01-London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 18p per 100 (N. America); £1.25 per 400 (Rest of world); £2.75 per 400 (Ships at sea).
Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.
It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.
Telemessages can be sent with an illustrated greetings card for 65p extra.

Radiopaging: No charge.
If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.
These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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ACU6

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Signature ____________________ Date ____________________

C. Please invoice the company/authority.

(✓) □ If you select this option, which is ONLY AVAILABLE to government establishments and Public Limited Companies, you will be sent an authorisation form for completion which will require an official order number to accept unspecified amounts.

Take a Knife to your discs...

Chris Wood dissects this disc sector editor



The Knife from Hisoft is another in its long line of products for the Amstrad range of computers. This one is a disc sector editor and file patcher for the serious disc user.

The disc contains eight files of which two are actual disc editors, some are useful utilities and the last is a text file which contains information about the latest updates to the disc.

Hisoft's policy of continually improving its products means that it adds features faster than the printers can keep up – this file tells you what the latest improvements or added commands do.

The file can be read with TYPE READ.ME when in CP/M or PIPped to your printer. In fact if you have any sensible suggestions for additions to the programs, then Hisoft may include them.

If you wish to take advantage of the new features Hisoft will update your disc for a nominal fee – contact them for more details.

The two main programs are called Knife and Knife2, and they work in very different ways as they are aimed at slightly different categories of people.

The Knife is menu driven and will allow you to work on sectors or files. If you work in sectors you can examine CP/M logical sized sectors of 128 bytes, either just moving forward and backwards through the disc or going straight to a specific track or sector.

In this case you can either change the contents of a sector by typing in hexadecimal numbers or plain text after you have moved to the correct place using the cursor keys. If you wish, you can print out the contents of a sector before you start altering it, or as a reminder of what you have done.

You also have the facility to swap parts of the disc around. Knife will allow you to store a sector, move to somewhere else and copy it into its new position. There is a search facility which will allow you to search for a string of 16 hexadecimal numbers or a string of text. You can use a binary mask on the search which will allow you to get a match on a string which contains a mixture of upper and lower case letters even if your search string doesn't – very useful.

If you work in file format you have all the same features as before, but this time you can enter the file name and even the user number if you have used this feature, and follow a file across the disc. This ability to trace a file is very useful as disc programs are not always laid out simply – they are put wherever there is space on the disc.

In contrast, Knife2 is a completely different type of sector editor – perhaps it should have been called Fork. It works on Amstrad's 512 byte physical sectors which are the equivalent of four CP/M sectors in one. This program is for the serious hacker who wants to get down to the nitty gritty of disc editing. All the commands are selected by Ctrl and a letter, but are very easy to remember.

Knife2 pulls in one 512 byte sector at a time and displays 256 bytes of it on the screen, allowing you to toggle between the two halves. Move around the display with the cursor keys and you can type in your changes in hexadecimal or Ascii. As with the Knife you can write a sector back to where it came from or to a different one, although this time they are the full 512 byte sectors instead of the Knife's 128 byte sectors.

You may search for a string of up to 80 bytes of hex, decimal or Ascii text with the same optional mask facility as Knife. The cursor is placed at the start of the string when found, but with an added feature. When you are searching for Ascii text and you cannot remember what the mask is, to allow you to catch both upper and lower case, then a mask value of zero will allow you to choose from a match on upper case, lower case or either, which is even more useful. If a string is found but is not the one you want, you can move to the next occurrence of the string if there is one.

Moving forward and backwards through the disc by a sector or track at a time is easily done using the shifted cursor keys or, as with Knife, you may select which track or sector you want and go straight there.

In the directory you can see that CP/M divides your programs across several tracks and sectors, and numbers each block. A block is the equivalent of two sectors, and two programs may share a block. CP/M starts its numbers at the directory, so you can move directly to it at any time by selecting block zero.

Knife2 will display your present track, sector, filename (if any) and the block number, unless you are in CP/M's reserved tracks, when it displays ** for the block as they aren't numbered. This means that when you jump to a track and sector or a block, which you read from the directory, you always know which program you are looking through. As with the Knife you can follow a file through its convoluted path across the disc.

Of course the obvious thing would be for you to go straight to a file by selecting its name from the directory, and of course you can do this. You only need to type in

as many letters of the filename as is needed to get a match. For instance if you have a file called "WASSNAME.BIN" and a file called "WHATME.BAS" you only need to enter "WA" to get a match on the first or "WH" for the second – a feature I found very useful.

Both Knife and Knife2 work with CP/M 2.2 and CP/M Plus, and alter their signing on messages accordingly. But as the PCW 8256 (Joyce) has a different keyboard layout, for instance, there is no Copy key. There is a program called KNCONFIG.COM which will allow you to decide which commands use which keys, so you can customise the program to your own taste. This has been done for you and the program KNIFE2J.COM already has them set up for the PCW 8256 with the list documented in the READ.ME text.

You may still use KNCONFIG.COM to change either of the Knife2 programs if they don't suit you, but as I said, I found them all very easy to use and remember. CTRL-B for block, CTRL-T for track and so on.

The remaining programs are small but useful utilities.

WDEL.COM is a menu driven file erasing program. It will accept normal CP/M wildcards and step through the chosen files allowing you to erase all of them, none of them, or choose each one in turn.

SDIR will give you an extended directory, telling you how many records there are in a file, whether there are any Extents and what their status is – SYS or DIR and RW or RO – and it will also tell you the remaining space on the disc, which is something I missed from the normal CP/M DIR command. This is so useful and small that I have copied it on to all my CP/M discs.

Program:	*The Knife*
Type:	*Utility*
Description:	*Disc sector editor*
Machines:	*CPC464/664/6128 and PCW8256*
Author:	*Hisoft/Aries*
Price:	*£14.95 (on disc)*
Supplier	*Hisoft*
Address:	*180 High Street North, Dunstable, Bedfordshire LU6 1AT. Tel: (0582) 696421*

The last file is UNERA.COM which is for restoring any files you may have erased by mistake. Simply enter CP/M and UNERA "name" to restore it, provided it has not been overwritten. This is quicker and easier than using either Knife or Knife2 to actually find and change the directory sectors.

Both programs can cope with all the different disc formats that the Amstrads use. In addition to its other uses, KNCONFIG.COM will also allow you to alter the number of tracks that Knife2 expects to find on the disc, and so will handle the discs on the PCW 8256 second disc drive – although you should save a differently configured version of the program specifically for this or you could upset AMDOS if you try to move a track that doesn't exist on a normal disc.

All in all, the two main programs complement each other beautifully, and the extra utilities are very useful additions to the package. They are also the first disc editors for the PCW 8256. So if you need to repair your disc, examine other people's discs (for instance several games discs have files on them that have merely been erased from the directory – a swift look with Knife2 and either change the E5 bytes to 00 or use UNERA.COM) or simply learn about how CP/M and AMSDOS use the discs, then this package is for you.

ACU

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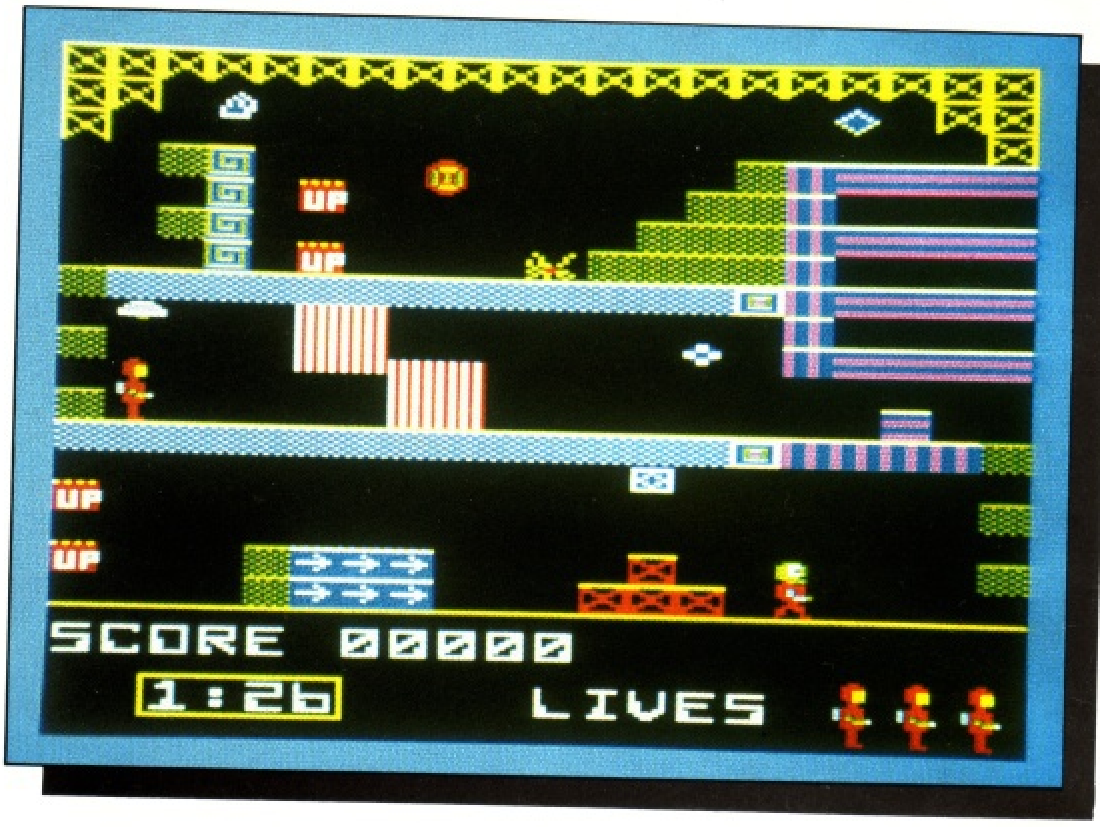


It's a label printer . . .



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SPACE MANIA



Our hero, Sammy the spaceman, has teleported on to a weird spaceship in order to explore it, only to find himself in severe peril. Unable to teleport back to his own ship he must collect all the power crystals and reach the ship's own teleporters. You must guide Sammy through the various sections of the ship.

Game controls

Controls are: Z and X to go left and right, and Shift to jump or use the joystick. Other keys are P to pause and O to turn pause off. Ctrl Q will turn off the sound and Ctrl S will turn it on. Delete quits the game.

Typing in the listings

As Space Mania is such a large game we are printing it in two parts. The second half will be printed next month.

In the meantime if you are going to save it on tape you will need at least two tapes – one to store a copy of the loader programs, in case of accidents, and one for the game the loaders create.

Type in Mania Loader first and save it on to the tape you will use for the game. Type in the other listings in order. Save each one on to your other tape. After saving each program put in the game tape and run the program. Correct any errors that show up and save it (not on the game tape). Run it again. If all is well, the program will save a machine code file on to the game tape. Don't forget to do each of the programs in order.

When you have created a tape with all the machine code on you can start to play. Rewind to the start of the games tape and press Ctrl and the small Enter key. Disc users need to run the Mania Loader program.

```
10 ' space mania listing 1
20 '
30 MEMORY &7FFF
40 addr=&8000
50 FOR ln=1000 TO 6710 STEP 10
60   READ bigdata$,checksum
80   checkall=checkall+checksum
90   FOR pointer=1 TO 16 STEP 2
100      byte$=MID$(bigdata$,pointer,2)
110      c$=MID$(byte$,1,1):GOSUB 210:c$=
    MID$(byte$,2,1):GOSUB 210
120      result=VAL("&"+byte$)
130      POKE addr,result
140      addr=addr+1
150      checksum=checksum-result
160 NEXT pointer
170 IF checksum<>0 THEN PRINT"CHECKSUM E
    RROR IN LINE";ln,bigdata$:STOP
180 NEXT ln
190 IF checkall=163938 THEN SAVE"mania1"
    ,b,&8000,&11DF ELSE PRINT"Incorrect
    number of data lines"
200 STOP
210 IF INSTR("0123456789ABCDEF",UPPER$(c
    $))=0 THEN PRINT"Typing error in lin
    e";ln,bigdata$ :STOP:ELSE RETURN
220 '
230 '
1000 DATA 206048607C60B060, 788
1010 DATA E460206160619461, 891
1020 DATA B861E4610C624862, 886
1030 DATA 7062A062DA620A63, 893
```

```
10 'space mania loader
20 '
30 MEMORY &2E00
40 LOAD"!mania1",&2F00
50 LOAD"!mania2",&5500
60 LOAD"!mania3",&6000
70 LOAD"!mania4",&7000
80 LOAD"!mania5",&8000
90 LOAD"!mania6",&8200
100 LOAD"!mania7",&8500
110 CALL &8950
```

By Neil Kolban




```
1040 DATA 39637F63AF63D363, 966
1050 DATA FE631A6442647F64, 872
1060 DATA 0000000000000000, 0
1070 DATA 0000000000000000, 0
1080 DATA 0000000000000000, 0
1090 DATA 0000000000000000, 0
1100 DATA 0000000000000000, 0
1110 DATA 0000000000000000, 0
1120 DATA 0000000000600000, 96
1130 DATA 0000000000000000, 0
1140 DATA 0000000000000000, 0
1150 DATA 0000000000000000, 0
1160 DATA 0000000000000000, 0
1170 DATA 0000000000000000, 0
1180 DATA 0000000000010000, 1
1190 DATA 0000000000000000, 0
1200 DATA 0000000000000000, 0
1210 DATA 0000000000000000, 0
1220 DATA 0000000000000000, 0
1230 DATA 0000000000000000, 0
1240 DATA 0000000000000000, 0
1250 DATA 0000000000000000, 0
1260 DATA 0000000000000000, 0
1270 DATA 0000000000000000, 0
1280 DATA 0000000000000000, 0
1290 DATA 0000000000000000, 0
1300 DATA 0000000000000000, 0
1310 DATA 0000000000000000, 0
1320 DATA 1000000000000000, 16
1330 DATA 0000100000000000, 16
1340 DATA 0000000010000000, 16
1350 DATA 0000000000001000, 16
1360 DATA 0000000000000000, 0
1370 DATA 1000044444499900, 382
1380 DATA 0AAA104000000044, 328
1390 DATA 44BBBADA10000000, 675
1400 DATA 094444BBBADA1400, 756
1410 DATA 0000004444BBBADA, 727
1420 DATA 100000AAAA4444BB, 679
1430 DATA BADA104000000000, 484
1440 DATA 00000AAA10000008, 204
1450 DATA 0000000000001400, 20
1460 DATA 0000000000000000, 0
1470 DATA 1000000A99900000, 323
1480 DATA 0000104000000000, 80
1490 DATA 0000000011000000, 17
```

```
1500 DATA 0000075555581110, 298
1510 DATA 0000000000000000, 0
1520 DATA 1111000000000000, 34
1530 DATA 0008111110000055, 143
1540 DATA 5555555500000000, 340
1550 DATA 0000000000000000, 0
1560 DATA 0000000000000000, 0
1570 DATA 0000000000000000, 0
1580 DATA 0000000000000000, 0
1590 DATA 0000000000111111, 51
1600 DATA 1999111111AA9013, 562
1610 DATA 33333BBB33333333, 552
1620 DATA 0010000000000000, 16
1630 DATA 0000091000000000, 25
1640 DATA 0000000000100000, 16
1650 DATA 0000000000009010, 160
1660 DATA 09990D00900DDDDD, 774
1670 DATA 001000000000000D, 29
```

```
1680 DATA DDDD091009000000, 476
1690 DATA 0000000000100000, 16
1700 DATA 0000000000009010, 160
1710 DATA 0900000000000000, 9
1720 DATA 0010000000000000, 16
1730 DATA 0000091009000000, 34
1740 DATA 0050050000000000, 85
1750 DATA 0000055005559000, 319
1760 DATA 0900055555500555, 354
1770 DATA 0000000000000000, 0
1780 DATA 0000000000000000, 0
1790 DATA 0000000000000000, 0
1800 DATA 0000000000009222, 180
1810 DATA 22222B2222222222, 281
1820 DATA 0000CCC000000000, 396
1830 DATA 00009000CCC00000, 540
1840 DATA 000000020000CCC0, 398
1850 DATA 0000000000009000, 144
1860 DATA CCC00C0000000002, 410
1870 DATA 0000CCC0CCC00000, 792
1880 DATA 00009000CCCCC0CC, 948
1890 DATA 000000020CCCCCCC, 626
1900 DATA 000CC00000009000, 348
1910 DATA CCC00000CC000002, 602
1920 DATA 0000CC0000000C90, 360
1930 DATA 0000900CC0000A00, 358
1940 DATA 9C9C000200CC0000, 518
```

```
1950 DATA 00000C0CC0009CC0, 564
1960 DATA 000009009C90CC02, 515
1970 DATA 0C00000000000C00, 24
1980 DATA 0CC0900000008880, 612
1990 DATA 9C90000233000000, 353
2000 DATA 0000000000333000, 99
2010 DATA 0000000000000003, 3
2020 DATA 0000000000000000, 0
2030 DATA 0000000000000000, 0
2040 DATA 0000000000000000, 0
2050 DATA 0000000000004440, 132
2060 DATA 0000000400000004, 8
2070 DATA 4440000000000009, 141
2080 DATA 0000444000000000, 132
2090 DATA 0000000044000000, 68
2100 DATA 0000000900004000, 73
2110 DATA 0022222222222222, 238
2120 DATA 0000022220002000, 100
2130 DATA 0002000022002000, 68
2140 DATA 2000000200022200, 70
2150 DATA 2000202222920022, 312
2160 DATA 2999200009200202, 271
2170 DATA 022200002A000020, 110
2180 DATA 0292922999992222, 709
2190 DATA 2220020200000000, 70
2200 DATA 0000000000922009, 187
2210 DATA 9999000000000002, 308
2220 DATA 1000000000001000, 32
2230 DATA 0000100000000000, 16
```

```
2240 DATA 1000000010000000, 32
2250 DATA 0000100000001000, 32
2260 DATA 0000000010040004, 24
2270 DATA 1000000000001400, 36
2280 DATA 0040100000000000, 80
2290 DATA 1000400011160000, 119
2300 DATA 0719100000001000, 64
2310 DATA 0000000010400044, 148
2320 DATA 1000000000091000, 41
2330 DATA 0000100000000000, 16
2340 DATA 1000400019600000, 201
2350 DATA 0071140000401000, 213
2360 DATA 0000000010000000, 16
2370 DATA 1900000000001004, 45
2380 DATA 0000100000000000, 16
2390 DATA 1000004011000000, 97
2400 DATA 0000100000001000, 32
2410 DATA 0000000910004000, 89
2420 DATA 1000000000000000, 16
2430 DATA 0000100000000001, 17
2440 DATA 0040040400000000, 72
2450 DATA 0000000000000000, 0
2460 DATA 0000000000000000, 0
2470 DATA 0000000000000000, 0
2480 DATA 0000000000000000, 0
2490 DATA 0000000000000000, 0
2500 DATA 000000000000EEEE, 476
2510 DATA EEEEEEBEEEEEEEEE, 1856
2520 DATA 0000000000000000, 0
2530 DATA 0000000000000000, 0
2540 DATA 0000000000000000, 0
2550 DATA 0000000000009EEE, 396
2560 DATA EEEEEEEEEEEEEEEE, 1904
2570 DATA 0000000000000000, 0
2580 DATA 0000900000000000, 144
2590 DATA 0000000000000000, 0
2600 DATA 000000000000EEEE, 476
2610 DATA EEEE88EEEEEEEEE9, 1797
2620 DATA 0000000000000000, 0
2630 DATA 0000000000000000, 0
2640 DATA 0000000900000000, 9
2650 DATA 000000000000EEEE, 476
2660 DATA EEEEEEEEEEEEEEEE, 1904
2670 DATA C000000000000000, 192
2680 DATA 0000C00000000000, 192
2690 DATA 00000000C0000000, 192
2700 DATA 000000000000CDD0, 413
```

```
2710 DATA 000000000000CCC0, 396
2720 DATA C00000000000000C, 204
2730 DATA C0C9C00000000000, 585
2740 DATA 00CC00C0C0000000, 588
2750 DATA 00000CC000C9CDD0, 818
2760 DATA 00000000CC0000C0, 396
2770 DATA C0000000000CC000, 396
2780 DATA 00C9C0000000000CC, 597
2790 DATA 000000C0C0000000, 384
2800 DATA 0CC0009C09C9C000, 762
2810 DATA 0000CC00000C00C0, 408
2820 DATA C000000CC009CCCC, 813
2830 DATA 09C9CDD000CC0000, 827
2840 DATA C00000C0C0000CCC, 792
2850 DATA 00CCC00009C9C000, 798
2860 DATA CCCC09C0009CCCC0, 1161
2870 DATA C00CCC0000C00000, 600
2880 DATA 0009CCCCCC0009C0, 822
2890 DATA 0090000000000000, 144
2900 DATA 0000000000000000, 0
2910 DATA 0000000000000000, 0
2920 DATA 0000000000000000, 0

2930 DATA 0000000000000070, 112
2940 DATA 0399999900060000, 468
2950 DATA 0000030000000000, 3
2960 DATA 0000000703000009, 19
2970 DATA 0700600060000300, 202
2980 DATA 0000000000700070, 224
2990 DATA 7300000960000700, 227
3000 DATA 7000030000005555, 285
3010 DATA 5555555555555555, 680
3020 DATA 0000000000000000, 0
3030 DATA 00000000000000A0, 160
3040 DATA A000A00000000000, 320
3050 DATA 0000000000000000, 0
3060 DATA 00A0A00000A000A0, 640
3070 DATA 000A000000000A000, 170
3080 DATA 000000000A000A00, 20
3090 DATA 000A0A0000000000, 20
3100 DATA 0000A00000000000, 160
3110 DATA A00A00000A000A00, 190
3120 DATA FFFFF0000000FFFF, 1260
3130 DATA FFFFFFFF0000000F, 1035

3140 DATA F0000000FFF00000, 735
3150 DATA 00FF000000000000, 255
3160 DATA 00F90FF0000FFF00, 774
3170 DATA 00000FF00F0000FF, 525
3180 DATA F0090000FFF90000, 753
3190 DATA 0FFF0000FFFFFFF0, 1275
3200 DATA 0000FFF0000F0000, 510
3210 DATA 00FFFFFFFFF0000FF, 1275
3220 DATA 0000000000FFF000, 495
3230 DATA 0FFF0000000000FF, 525
3240 DATA F00000FF900FBBBF, 1032
3250 DATA FFFFFFF0000F000F, 1035
3260 DATA BBBFFFFF00FF0000, 1143
3270 DATA 900FBBBFFFF0000F, 1047
3280 DATA F000000FBBBFFF00, 888
3290 DATA 0000FF00900FFFFF, 924
3300 DATA F000FF000FF00000, 750
3310 DATA 0000000FFFF000F8, 758
3320 DATA 9000000000FFFFFF, 909
3330 DATA 0000000000000FFF, 270
3340 DATA FFFFF00800000000, 758
3350 DATA 0000000000000000, 0
3360 DATA 0000000000000000, 0
3370 DATA 0000000000000000, 0
3380 DATA 0000940104010401, 159
3390 DATA 0401040100040000, 14
3400 DATA 0000000000009004, 148
3410 DATA 0000000000000004, 4
3420 DATA 0001000000000000, 1
3430 DATA 0000900144114411, 315
3440 DATA 4419999900040000, 403

3450 DATA 0000001000009004, 164
3460 DATA 9000000000400000, 208
3470 DATA 0001000000000000, 1
3480 DATA 0000900190000000, 289
3490 DATA 0000000000044114, 89
3500 DATA 4114411900009000, 319
3510 DATA 0000000001009000, 145
3520 DATA 0000000000000400, 4
3530 DATA 0900900000000000, 153
3540 DATA 0400009000000000, 148
3550 DATA 0000010000091144, 95
3560 DATA 1144114411441144, 340
3570 DATA 0000000000000000, 0
3580 DATA 0000000000000000, 0
3590 DATA 0000000000000000, 0
3600 DATA 0000000000000000, 0
3610 DATA 0000000000000000, 0
3620 DATA 2200000000000000, 34
3630 DATA 0222000000000000, 36
3640 DATA 0000000900000000, 9
3650 DATA 0000000000000000, 0
3660 DATA 002222B22BB20009, 476
3670 DATA 0000000000000000, 0
3680 DATA 0000000000000000, 0
3690 DATA 0000000900000000, 9
3700 DATA 000000000000299B, 196
3710 DATA 999999B99BB99990, 1281
3720 DATA 0000000000000000, 0
3730 DATA 0020000000000000, 32
3740 DATA 0000000200000000, 2
3750 DATA 0000000000200000, 32
3760 DATA 0000000002000002, 4

3770 DATA 0000000000002320, 67
3780 DATA 0020550000500002, 199
3790 DATA 33320002ECECECEC, 1047
3800 DATA ECE000000000CECE, 872
3810 DATA CECECEC000000000, 810
3820 DATA EC00000000000000, 236
3830 DATA 0000C00000000000, 192
3840 DATA 09999999E9E00000, 925
3850 DATA 000090000000C0C0, 528
3860 DATA 0000000900000000, 9
3870 DATA E9EC000000900000, 613
3880 DATA 0000C0CE00000900, 407
3890 DATA 00000000E9ECEDFD, 959
3900 DATA FDFDFDFDFDFD00CE, 1724
3910 DATA C00A000000A00008, 370
3920 DATA 00EC000000000000, 236
3930 DATA 000000CE00000000, 206
3940 DATA 0000000800E00000, 232
3950 DATA 000000000000CEC0, 398
3960 DATA 0000000000000009, 9
3970 DATA EC00000D000000F0, 489
3980 DATA 0000CE00009F0000, 365
3990 DATA 00D90008E000000D, 462
4000 DATA BBBBBBF09000C000, 1137
4010 DATA 008FBBBBBBD90908, 938
4020 DATA 0000000000000000, 0
4030 DATA 0000000000000000, 0
4040 DATA 0000000000000000, 0
4050 DATA 0000000000000000, 0
4060 DATA 0000000000000000, 0
4070 DATA FEFEFEFEFEFEFEFE, 2032
4080 DATA FEFE000000000000, 508
4090 DATA 0000000000000000, 0
4100 DATA 0080000000005CCC, 424
4110 DATA CCCCCDCC60ECCCC0, 1545
4120 DATA 500009000D9000E0, 470
4130 DATA 0000500000000D00, 93
4140 DATA 00E0000950000900, 322
4150 DATA 0D3003E000905000, 512
4160 DATA 00000D0000E00909, 255
4170 DATA 500001000D0030E0, 366
4180 DATA 9090500000000D00, 381
4190 DATA 00E9090950001010, 363
4200 DATA 0D3000E090905000, 653

4210 DATA 00000D0030E00909, 303
4220 DATA 500001000D000000, 94
4230 DATA 0090500100010D03, 242
4240 DATA 0000000911111111, 77
4250 DATA 1111111111111100, 119
4260 DATA 0000000000000011, 17
4270 DATA 1000000000000000, 16
4280 DATA 0001009500000000, 150
4290 DATA 009CEEEE00050800, 645
4300 DATA 000099C000000095, 314
4310 DATA 0000000999CEEEE, 785
4320 DATA 000508000009999C, 331
4330 DATA 0000922222222222, 316
4340 DATA 22ACEEEE00000000, 682
4350 DATA 0000000C00009000, 156
4360 DATA 000000000000CEEEE, 488
4370 DATA 0000000000000000, 0
4380 DATA 0000900000000000, 144
4390 DATA 00000E0022222222, 150
4400 DATA 222222ACCCC90000, 679
4410 DATA 0000000000000000, 0
4420 DATA 8000000000000000, 128
4430 DATA 0009000000000000, 9
4440 DATA 0000000080009666, 380
4450 DATA 0000400000090000, 73
4460 DATA 9666000444000000, 324
4470 DATA CECECECECECECEC5, 1639
4480 DATA 0050000000000000, 80
4490 DATA 0005005000000000, 85
4500 DATA 0000000500000000, 5
4510 DATA 0000000000050000, 5
4520 DATA 0000000000000005, 5
4530 DATA 0050000000000000, 80

4540 DATA 0005005000000000, 85
4550 DATA 00000055559CDCD, 589
4560 DATA CD0039999930500, 720
4570 DATA DCDCDC0033999933, 1068
4580 DATA 0009CDCDCD003339, 732
4590 DATA 93330500DCDCDC00, 863
4600 DATA 3339933300090000, 315
4610 DATA 0000339999330500, 413
4620 DATA 0000000039999993, 510
4630 DATA 0009333933333339, 327
4640 DATA 9333050000000000, 203
4650 DATA 0000000000090009, 18
4660 DATA 0000000080000500, 133
4670 DATA 0000000000000000, 0
4680 DATA 0009000900000000, 18
4690 DATA 80000500CCF00000, 577
4700 DATA 000000000000CF00, 207
4710 DATA 0000000000000000, 0
4720 DATA F000000000000000, 240
4730 DATA 0000000000000000, 0
4740 DATA 0000000000000900, 9
4750 DATA 90090AAAAAAA0011, 690
4760 DATA 1100000000000000, 17
4770 DATA 0000000000000000, 0
4780 DATA 0000001000100000, 32
4790 DATA 0000000000000000, 0
4800 DATA 0000000000000100, 1
4810 DATA 000111111AAAAAAA, 571
4820 DATA 0000000000000000, 0
4830 DATA 0000010000000000, 1
4840 DATA 0000000000000000, 0
4850 DATA 000000000000100C, 28
4860 DATA 00002000CC000000, 236
4870 DATA 0000000220000CC0, 238
4880 DATA 0000100000222200, 84
4890 DATA 00CCCCCC00000222, 648
4900 DATA 2220000000001000, 82
4910 DATA 2222222200000000, 136
4920 DATA 0000000000000000, 0
4930 DATA 0000000000000000, 0
4940 DATA 0000000000000000, 0
4950 DATA 000000000009CDC, 376
4960 DATA DCDCDCDCDCDCDCDC, 1760
```

```
4970 DATA 000000000000000D, 13
4980 DATA CDCD900000000000, 554
4990 DATA 0000DCDC00000000, 440
5000 DATA 000000000DCD9000, 362
5010 DATA 00000000000000DC, 220
5020 DATA 1100000000000111, 35
5030 DATA 000D000000000000, 13
5040 DATA 0555500000000000, 170
5050 DATA 0000000555000000, 90
5060 DATA 0000000000055550, 170
5070 DATA 000AAABBABBAA005, 889
5080 DATA 55598AAAAABBABBA, 1196
5090 DATA AAA5555000000000, 500
5100 DATA 0000000000098000, 137
5110 DATA 0000000000000000, 0
5120 DATA 0000000000000000, 0
5130 DATA 0009AAAAAAAAAAAA, 1029
5140 DATA AAAA000067676767, 752
5150 DATA 6767676767670000, 618
5160 DATA 0000000000000000, 0
5170 DATA 0000000000000000, 0
5180 DATA 0000000000000000, 0
5190 DATA 0000000000000000, 0
5200 DATA 0000000000000000, 0
5210 DATA 0000000000000000, 0
5220 DATA 09660000AAAA000A, 461
5230 DATA AA0000330000A000, 381
5240 DATA 0000000090330000, 195
5250 DATA A0000000000A0033, 221
5260 DATA 0000AAAA000AAA00, 520
5270 DATA 0933CCCC33330003, 573
5280 DATA 3300003300003333, 204
5290 DATA 0593330090330C00, 410
5300 DATA 0000050000000033, 56
5310 DATA 0000000095800000, 277
```

```
5320 DATA 09330C0000933333, 321
5330 DATA 3339003300000000, 159
5340 DATA 000000009000C00, 156
5350 DATA 0090000000090000, 153
5360 DATA 0000000000000000, 0
5370 DATA 1111000000000000, 34
5380 DATA 0000111000000000, 33
5390 DATA 0000000011000000, 17
5400 DATA 0000000000001000, 16
5410 DATA 0000999999999999, 918
5420 DATA 0000000000000000, 0
5430 DATA 0000000011111000, 50
5440 DATA 000000090001D000, 218
5450 DATA 0000000000000011, 17
5460 DATA D000000000000009, 217
5470 DATA 0111D00000000000, 226
5480 DATA 0000901111111000, 211
5490 DATA 1000100100011111, 68
5500 DATA 1000100010019000, 193
5510 DATA 0000000000000000, 0
5520 DATA 0000000000000000, 0
5530 DATA 0000999999999999, 918
5540 DATA 99999999BBBBBBBB, 1360
5550 DATA BBBBBBBBBBB00000, 1111
5560 DATA 0000000000000009, 9
5570 DATA 0000000000000000, 0
5580 DATA 0000000000000000, 0
5590 DATA 0000000944410000, 142
5600 DATA 0000000014444411, 173
5610 DATA 0000000000001144, 85
5620 DATA 4111000000000000, 82
5630 DATA 1114000000A0A00, 57
5640 DATA 000000000000000A, 10
5650 DATA 0A00000000000000, 10
5660 DATA 0FFF9FFFF0000000, 924
5670 DATA 0000FFF000FFFF00, 1005
5680 DATA 0000EEEEEF00000F, 730
5690 DATA FFFFF9FF00000000, 1014
5700 DATA 0000000000000000, 0
5710 DATA 0000000000000900, 9
5720 DATA EEEEEF00000FFFFF, 1240
```

```
5730 DATA FFFF00000FF000FF, 1020
5740 DATA F000000000000FFF, 510
5750 DATA 9FFF003000000030, 510
5760 DATA 0003030000000300, 9
5770 DATA 0000000393000003, 153
5780 DATA 0000030030030300, 57
5790 DATA 3000000000000000, 48
5800 DATA 9000003003000030, 243
5810 DATA 0000000030000000, 48
5820 DATA 0000000000000000, 0
5830 DATA 0000000000000000, 0
5840 DATA 0000000000000000, 0
5850 DATA 0000000000000080, 128
5860 DATA 0080800800033333, 369
5870 DATA 0033003030300090, 339
5880 DATA 0300003030303300, 198
5890 DATA 0009030300300330, 114
5900 DATA 3030000093000030, 291
5910 DATA 0030300300000303, 105
5920 DATA 0030003030030000, 147
5930 DATA 9300AAAAAAAAAAAA, 1167
5940 DATA A999030344444444, 600
5950 DATA 4444400000004444, 336
5960 DATA 4004444400000003, 207
5970 DATA 0444000044400000, 204
5980 DATA 0039004000000400, 125
5990 DATA 0000033900000000, 60
6000 DATA 0000000033394000, 172
6010 DATA 0033000300033339, 165
6020 DATA 4400003300030003, 125
6030 DATA 0009444003333033, 294
6040 DATA 3003900933300000, 303
6050 DATA 0000000003333300, 105
6060 DATA 0000000000000033, 51
6070 DATA 3000000000000000, 48
6080 DATA 0003000000000000, 3
```

```
6090 DATA 0000000000000000, 0
6100 DATA 0000000000000000, 0
6110 DATA 5555555000071110, 375
6120 DATA 0005500080550000, 298
6130 DATA 1119005500000005, 132
6140 DATA 5060111009500055, 383
6150 DATA 8000500030090050, 345
6160 DATA 0555550050073000, 310
6170 DATA 9059555555505000, 648
6180 DATA 3009005005555508, 320
6190 DATA 5060300009590055, 407
6200 DATA 5000500030090055, 302
6210 DATA 0000000550073000, 140
6220 DATA 9005500000550000, 314
6230 DATA 3009000055555550, 392
6240 DATA 0060300309000000, 156
6250 DATA 0000000030030000, 51
6260 DATA 0000000000073333, 109
6270 DATA 3333333333333333, 408
6280 DATA 3333300000000000, 150
6290 DATA 0000000330000000, 51
6300 DATA 0000000000033000, 51
6310 DATA 0000000000000003, 3
6320 DATA 300000AA00000000, 218
6330 DATA 000030000AAAA000, 388
6340 DATA 00000000AAAAAAAA, 680
6350 DATA AAAAA00900090000, 518
6360 DATA 0000000000000000, 0
6370 DATA 0000000000000000, 0
6380 DATA 0009000000000000, 9
6390 DATA 0000000041414141, 260
6400 DATA 4141400090090000, 347
6410 DATA 0000000000000000, 0
6420 DATA 0000000000000000, 0
6430 DATA 0009000000000000, 9
6440 DATA 0000000090220000, 178
6450 DATA 0000022000090000, 43
6460 DATA 0000000002320000, 52
6470 DATA 9000000000000233, 197
6480 DATA 2009000000000000, 41
6490 DATA 0233320000000000, 103
```

```
6500 DATA 0000000000000000, 0
6510 DATA 0000000000000000, 0
6520 DATA 0000000000000000, 0
6530 DATA 0000000000000000, 0
6540 DATA 0000000000000000, 0
6550 DATA 000000000000EDED, 474
6560 DATA EDEDEDDD000000DD, 1153
6570 DATA 0000000000000000, 0
6580 DATA 00DD000000000000, 221
6590 DATA 0000000D00000000, 13
6600 DATA 00000000000DD0000, 221
6610 DATA 000000000000000D, 13
6620 DATA 93333333BBCCCCCC, 1099
6630 DATA CCCC00000000000A, 418
6640 DATA 0000000090000000, 144
6650 DATA 0000000000000000, 0
6660 DATA 0000000000000000, 0
6670 DATA 90000000000A0000, 154
6680 DATA 000A00000000000A, 20
6690 DATA 000000A090006660, 502
6700 DATA 00AAA0000A000000, 340
6710 DATA 6660000A0000A000, 368
```

```
10 ' space mania listing 2
20 '
30 MEMORY &7FFF
40 addr=&8000
50 FOR ln=1000 TO 2870 STEP 10
60   READ bigdata$,checksum
80   checkall=checkall+checksum
90   FOR pointer=1 TO 16 STEP 2
100     byte$=MID$(bigdata$,pointer,2)
110     c$=MID$(byte$,1,1):GOSUB 210:c$=
   MID$(byte$,2,1):GOSUB 210
120     result=VAL("&"+byte$)
130     POKE addr,result
140     addr=addr+1
150     checksum=checksum-result
160 NEXT pointer
170 IF checksum<>0 THEN PRINT"CHECKSUM E
   RROR IN LINE";ln,bigdata$:STOP
180 NEXT ln
190 IF checkall=125064 THEN SAVE"mania2"
   ,b,&8000,&5DF ELSE PRINT"Incorrect n
   umber of data lines"
200 STOP
210 IF INSTR("0123456789ABCDEF",UPPER$(c
   $))=0 THEN PRINT"Typing error in lin
   e";ln,bigdata$ :STOP:ELSE RETURN
220 '
230 '
1000 DATA CD06B9F52A269F23, 915
1010 DATA 7CE6076722269F6E, 805
1020 DATA F1CD0CB9ED5FADC9, 1349
1030 DATA 2132553E00464823, 407
1040 DATA F5E5CD32BCE1F13C, 1443
1050 DATA FE1020F1060B48C3, 827
1060 DATA 38BC00060208181A, 310
1070 DATA 1412060208181A14, 124
1080 DATA 120D79E6F81600CB, 855
1090 DATA 27CB12625FCB27CB, 898
1100 DATA 14CB27CB146F1979, 742
1110 DATA E607CB27CB27CB27, 963
1120 DATA 84677D806F7CCE00, 929
1130 DATA F6C067C9CB7F2039, 1161
1140 DATA CD7656DD4616E57E, 1077
1150 DATA 1AA728057EE60320, 629
1160 DATA 23231B10F2E1DD35, 854
1170 DATA 18281C0D28063E08, 221
1180 DATA 846718DF3E50856F, 868
1190 DATA 3E088CE63FF6C067, 1044
1200 DATA 0E0818CFE137C9A7, 901
1210 DATA C9CD76563A169F3D, 910
1220 DATA 835F7ACE0057DD46, 932
1230 DATA 16E51AA728057EE6, 845
1240 DATA 0320E1231B10F3E1, 806
1250 DATA DD351828DA3A169F, 795
```

```
1260 DATA CB27835F7ACE0057, 883
1270 DATA 0D28063E08846718, 388
1280 DATA D53E50856F3E088C, 809
1290 DATA E63FF6C0670E0818, 880
1300 DATA C5CD7656DD4616E5, 1148
1310 DATA 1ABE202323131 0F8, 601
1320 DATA E1DD3518281C0D28, 644
1330 DATA 063E08846718E53E, 626
1340 DATA 50856F3E088CE63F, 827
1350 DATA F6C0670E0818D5E1, 1025
1360 DATA 37C9A7C9CD7656DD, 1254
1370 DATA 4616E57EC54FE6AA, 1123
1380 DATA 280DE5CD0055E1E6, 1027
1390 DATA AA4779E655B04F79, 1053
1400 DATA E655280DE5CD0055, 887
1410 DATA E1E6554779E6AAB0, 1308
1420 DATA 4F79C1AE772310D3, 948
1430 DATA E1DD3518C80D2806, 782
1440 DATA 3E08846718C13E50, 664
1450 DATA 856F3E088CE63FF6, 993
1460 DATA C0670E0818B1E67F, 875
1470 DATA CB27214E57856F7C, 808
1480 DATA CE00677E23666FE5, 912
```

```
1490 DATA 79E60732159FCD42, 859
1500 DATA 55D11A32169F131A, 596
1510 DATA 32189F133A159FED, 727
1520 DATA 44C6084FC9F5E67F, 1156
1530 DATA CB27214E57856F7C, 808
1540 DATA CE00677E23666FE5, 912
1550 DATA 79E60732019FCD42, 839
1560 DATA 55D11A32029F131A, 576
1570 DATA 32049F133A019FED, 687
1580 DATA 44C6084FF1E68020, 984
1590 DATA 29DD4602E51AAE77, 882
1600 DATA 231310F9E1DD3504, 822
1610 DATA C80D28063E088467, 564
1620 DATA 18E73E50856F3E08, 711
1630 DATA 8CE63FF6C0670E08, 996
1640 DATA 18D73A029F3D835F, 745
1650 DATA 7ACE0057DD4602E5, 937
1660 DATA 1AC54FE6AACB3F47, 1039
1670 DATA 79E655CB27B0C1AE, 1221
1680 DATA 77231B10EBE13A02, 717
1690 DATA 9FCB27835F7ACE00, 955
1700 DATA 57DD3504C80D2806, 624
1710 DATA 3E08846718CE3E50, 677
1720 DATA 856F3E088CE63FF6, 993
1730 DATA C0670E0818BE0070, 643
1740 DATA 3970727081708970, 885
1750 DATA B070D770FE702571, 1131
1760 DATA 4C7173719A71C171, 990
1770 DATA E8710F7236725D72, 849
1780 DATA 8472AB72D272F972, 1218
1790 DATA 32736B739573BF73, 957
1800 DATA F873317446745E74, 924
1810 DATA 7374887488749F74, 1010
1820 DATA C974F37416753975, 989
1830 DATA 58758875CA75F175, 1135
1840 DATA 0C7627766A76AD76, 802
1850 DATA F17635776B77A177, 1037
1860 DATA C077DB7701782078, 922
1870 DATA 4B7876788578F078, 1094
1880 DATA 2F796E79BD790C7A, 843
1890 DATA 417A767A977AB87A, 1006
1900 DATA EB7A167B617B827B, 975
1910 DATA 0000A57BDA7B0F7C, 768
1920 DATA 5A7CA57CD47CDB7C, 1182
1930 DATA 207D9B7DC67DE77D, 1116
1940 DATA 3E7E957EC87EFB7E, 1166
1950 DATA 0858165824583258, 468
1960 DATA 40584E585C586A58, 692
1970 DATA 000100002A204B4E, 228
1980 DATA 45494C202A200001, 325
1990 DATA 00004D495353204A, 422
2000 DATA 494C4C2000010000, 258
2010 DATA 5A49474759205A41, 581
2020 DATA 5020000100004752, 266
```

```
2030 DATA 4541542042415244, 531
2040 DATA 000100004D2E412E, 235
2050 DATA 2026204A2E430001, 290
2060 DATA 000054484520524F, 418
2070 DATA 434B592000010000, 264
2080 DATA 474248205749 4C4C, 553
2090 DATA 4945000100004755, 299
2100 DATA 205354554445 4E54, 583
2110 DATA 315354324E443352, 545
2120 DATA 4434544836544837, 541
2130 DATA 5448385448BB58CC, 847
2140 DATA 58D758EC58FD5802, 1058
2150 DATA 5907590C59115916, 414
2160 DATA 591B591F5923596B, 556
2170 DATA 59715982599159A5, 909
2180 DATA 59AD59B759F1592B, 996
2190 DATA 5A7B5A1F01160F05, 377
2200 DATA 53434F5245202020, 476
2210 DATA 202030001F0B180F, 193
2220 DATA 054C49564553001F, 423
2230 DATA 01010F0553505249, 340
2240 DATA 5445204F56455246, 571
2250 DATA 4C4F57001F01160F, 311
2260 DATA 0654454C45504F52, 545
2270 DATA 54494E47001F1416, 379
2280 DATA 50001F141620001F, 216
2290 DATA 131643001F131620, 212
2300 DATA 001F121651001F12, 201
2310 DATA 1620001F01180008, 118
2320 DATA 2008001F04020F04, 96
2330 DATA 535041434520204D, 505
2340 DATA 414E49412021211F, 410
2350 DATA 02070F05434F4E47, 324
2360 DATA 524154554C415449, 614
2370 DATA 4F4E532E2E2E1F01, 410
2380 DATA 0A594F5520415245, 511
2390 DATA 204E4F572052414E, 533
2400 DATA 4B45442E2E1F090D, 357
2410 DATA 0F06001F06150E04, 97
```

```
2420 DATA 000C4E6F20736372, 561
2430 DATA 65656E73206C6566, 770
2440 DATA 7400535041434520, 512
2450 DATA 4D414E4941202121, 456
2460 DATA 001F0318414E5920, 322
2470 DATA 4B455920544F2053, 543
2480 DATA 5441525400442045, 484
2490 DATA 204D204F0042204F, 397
2500 DATA 204E20552053000F, 357
2510 DATA 051F0307444F4447, 332
2520 DATA 45204D4554454F52, 561
2530 DATA 5320544F1F050943, 390
2540 DATA 4F4C4C4543542042, 549
2550 DATA 4F4E55531F080C41, 441
2560 DATA 202D2055501F080E, 327
2570 DATA 5A202D20444F574E, 511
2580 DATA 000F051F0307424F, 206
2590 DATA 554E434520535048, 566
2600 DATA 45524520544F1F05, 451
2610 DATA 09434F4C4C454354, 527
2620 DATA 20424F4E55531F08, 462
2630 DATA 0C41202D2055501F, 382
2640 DATA 080E5A202D20444F, 368
2650 DATA 574E000F051F0207, 225
2660 DATA 53484F4F5420414C, 570
2670 DATA 49454E2053484950, 560
2680 DATA 1F0309544F20434F, 384
2690 DATA 4C4C45435420424F, 549
2700 DATA 4E55531F080C5A20, 419
2710 DATA 2D204C4546541F08, 415
2720 DATA 0E58202D20524947, 437
2730 DATA 48541F0410534849, 435
2740 DATA 4654202D2053484F, 497
2750 DATA 4F54001F020A594F, 374
2760 DATA 5520484156452042, 507
2770 DATA 454154454E1F040C, 412
2780 DATA 5448452047414D45, 539
2790 DATA 20414E441F020E41, 355
```

```
2800 DATA 5741524445442054, 555
2810 DATA 4845205449544C45, 559
2820 DATA 1F02104F46202253, 347
2830 DATA 50414345204D414E, 533
2840 DATA 494143221F011453, 374
2850 DATA 504C554E44494720, 563
2860 DATA 5655522054485249, 596
2870 DATA 4747000000000000, 142
```

```
10 ' space mania listing 3
20 '
30 MEMORY &7FFF
40 addr=&8000
50 FOR ln=1000 TO 2500 STEP 10
60   READ bigdata$,checksum
80   checkall=checkall+checksum
90   FOR pointer=1 TO 16 STEP 2
100     byte$=MID$(bigdata$,pointer,2)
110     c$=MID$(byte$,1,1):GOSUB 210:c$=
   MID$(byte$,2,1):GOSUB 210
120     result=VAL("&"+byte$)
130     POKE addr,result
140     addr=addr+1
150     checksum=checksum-result
160 NEXT pointer
170 IF checksum<>0 THEN PRINT"CHECKSUM E
   RROR IN LINE";ln,bigdata$:STOP
180 NEXT ln
190 IF checkall=53859 THEN SAVE"mania3",
   b,&8000,&4BF ELSE PRINT"Incorrect nu
   mber of data lines"
200 STOP
210 IF INSTR("0123456789ABCDEF",UPPER$(c
   $))=0 THEN PRINT"Typing error in lin
   e";ln,bigdata$ :STOP:ELSE RETURN
220 '
230 '
```

```
1000 DATA A50600001046BA00, 443
1010 DATA FF0041000A4B3402, 459
1020 DATA 00500000A01A36FE, 574
1030 DATA 00460001B74B2CFF, 628
1040 DATA 9019000213481A02, 290
1050 DATA 36191B022D1E1E02, 215
1060 DATA 0F091C0012141800, 114
1070 DATA 010022008C47A000, 406
1080 DATA FF001E01753C16FF, 740
1090 DATA 7E4B00020A491E02, 318
1100 DATA 3C4C1C02783E1D02, 379
1110 DATA 0F051A0149432200, 221
1120 DATA 3E2A220200280000, 180
1130 DATA 131414000 1002A00, 102
1140 DATA 133E9500FF002A01, 528
1150 DATA 990F16FF902D0002, 636
1160 DATA 32241A025A241E02, 272
1170 DATA 500A1A029B3E1D02, 366
1180 DATA 12051D029B0F1C02, 254
1190 DATA 1246270195162C00, 343
1200 DATA 050A2A0001002800, 98
1210 DATA 45321602011414FF, 439
1220 DATA 1B0500021B4B3202, 188
1230 DATA 691B1D02843E3102, 408
1240 DATA 5C281E0144202C01, 308
1250 DATA 9A2A22002D0C2800, 327
1260 DATA 01001D002D302800, 163
1270 DATA 0100170040252E00, 171
1280 DATA 010027FF24050002, 338
1290 DATA 003C1E021B1E1A02, 177
1300 DATA 521B1B02084D1C00, 251
1310 DATA 3610280001001000, 127
1320 DATA 5A222900FF001900, 445
1330 DATA 7E07280001002200, 208
1340 DATA 9246AA00FF004100, 706
1350 DATA 14353402013218FF, 457
1360 DATA 1B0500027F031E02, 196
1370 DATA 124B33023E4B3202, 335
1380 DATA 5D4C300291031C00, 395
```

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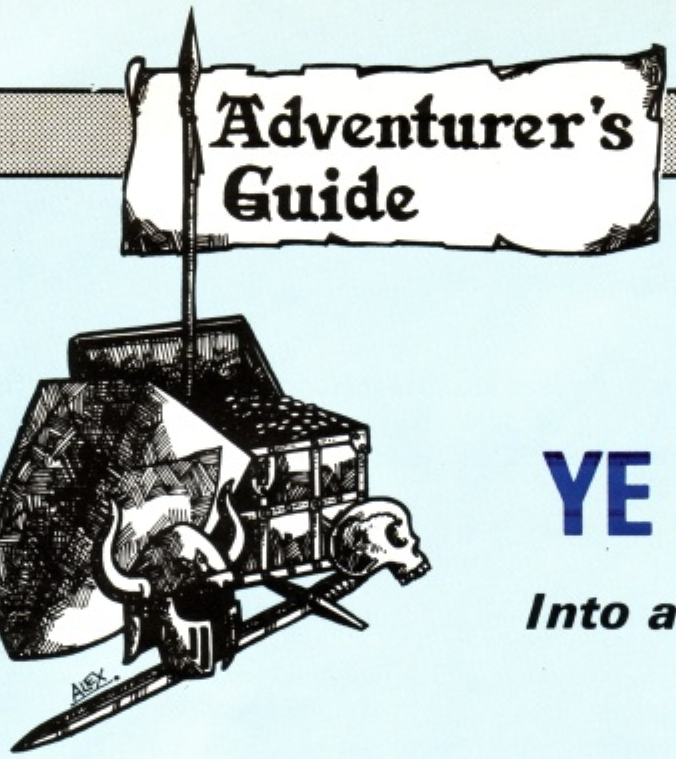
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And then there was Zork

In 1977 a group at the Massachusetts Institute of Technology (MIT) developed a new parser that would understand such inputs as "Kill troll with sword", "Open grey box" and "Get all books except the red one".

The first game to use one of these new parsers was Zork, originally developed on a DEC System 10 computer. It was later converted to run on other computers but in each case the memory requirement was in the region of megabytes rather than kilobytes.

Time passed and the micro began to show its paces and prove to the world it was here to stay. The operating system for Zork was rewritten in ZIL – Zork Implementation Language. The saving in memory was simply fantastic, but even so it was impossible to implement Zork on a micro without separating it into three sections.

The conversion of Zork for use on a micro is not only an interesting bit of computer adventure gaming history but also gives us the beginnings of Infocom, probably the most famous name in adventure games in the world.

Infocom games have been converted for many different operating systems and not surprisingly CP/M is one of them. Amstrad computer users may now join in and play these excellent games. Whatever Amstrad you have – provided you have a disc drive – there will be an Infocom adventure to suit your needs.

Not all its titles are available at present but have patience – they will appear in time. Infocom has games for most tastes, science fiction, detective, swords and sorcery and just plain zany like the Hitchiker's Guide to the Galaxy.

Apart from the advanced parser, the main feature of Infocom games is the highly descriptive text screen with each new location and whenever something of interest is examined. All are disc based with the interpreter resident in the computer's memory and game data read from disc at nearly every move. This in turn means you have an adventure that greatly exceeds the memory capacity of your computer.

Infocom games have greatly influenced some British software houses. For instance Level Nine, in trying to emulate Infocom's game structure, has in all probability surpassed this aim in producing adventures that are more accessible to the first time player.

One fault – if it is a fault – of Infocom's complex input recognition routine, is the fiddly complexity that this itself imposes.

The very versatile commands require the first six letters of a word to be typed in – rather than the more normal four letters.

I also wonder how many players actually type in "Take everything except the blue book" rather than "Take all", followed by "drop blue book". There is no doubt in my mind that Infocom games are as good as anything else on the market, but I feel we should not be blinded by the press's stress on these technical wonders.

Underground...

Zork I is a classic adventure, and as the game itself says, "Every computer should have one". Of all the early Infocom games this is the one for the beginner. It is not easy but is fun and brings a great sense of achievement when you win through each puzzle. It is also a great ego booster, with every correct step on the way bringing an increase in your score.

Also known as The Great Underground Adventure, Zork I starts outside an apparently deserted house in the middle of wooded country. The entrance to the underground domain is in the house but the countryside around also has some hidden treasures, so don't ignore it completely.

Your prime aim is to gather treasures and return them to the trophy case in the house. Mapping is vitally important and there is an added complication when exploring the two mazes. The standard method to map a maze is to drop objects to identify that location when you return. In Zork I, however, a thief roams around and objects dropped may not be there when you return.

There are other characters you will meet, some of whom you will need to fight. This aspect was another first for the original Zork. DIAGNOSE will display your

present state of health and, if you have been wounded, the number of turns needed to fully recover.

The location descriptions are very colourful and – even in 80 column mode – in some cases fill nearly half the screen. You may choose the length of these descriptions with VERBOSE, BRIEF, or SUPER-BRIEF. There is also the unusual option of being able to ask questions with commands such as WHAT IS . . . or WHERE IS . . . You may not always get a satisfying answer but it's nice touch.

Try asking: "What is a grue"? – grues are Infocom's own special nasties that will grab you if you stay too long in the dark. A battery-driven lantern is found in the house – but use it with care as the batteries will not last forever. There are also matches, candles and a torch so keep your eyes open for these additional sources of that precious commodity – light.

The underground system found in Zork is not a natural cave system as in the original Adventure but is created by a mixture of magic and high technology. You will come across a high-tech dam, a coal mine and also the entrance to Hades – quite a mixture.

This game is devious, watch your score closely to see how well you are doing. Do not carry too much underground to start with, as you will not then be able to carry many treasures back to that trophy case. There are several weapons to be found but some are more effective than others. Read any more books very carefully, remember that books have more than one page and most definitely SAVE your game position before pressing any buttons.

We will look at more Infocom games in the future, so if don't you have a disc drive . . . get one. They are not cheap but they are guaranteed to give you a pleasant headache.

Old but good

Having just looked at a classic adventure costing in the region of £19, how about one for less than £2? Abersoft's version of the original Adventure can be found under the Amsoft label and my local shop is selling it for £1.99. *(Note: This is not the standard price)* This text only adventure has been around for quite a long time but will make a good addition to your library.

A version of this Classic Adventure from Abersoft was first produced for the Spectrum under the title Adventure 1. When I first saw this about four years ago I was amazed the adventure could be compressed with such volumes of text to fit into the puny memory of a home computer.

Nowadays, with Level Nine in full cry, we become accustomed to such feats of magic. Indeed Level Nine's own Colossal Adventure is also an excellent version of Crowther and Woods' original masterpiece from 1975.

Based on the game that subsequently pushed the group at MIT to produce Zork, Classic Adventure uses a simple verb/noun input that is very easy for the newcomer to master. The game is very close to the original and contains many of the adventure ploys that we now come to expect.

Indeed when I first played a version of Adventure, many years after its introduction, I kept on getting that feeling of déjà vu, purely because so much had been written about adventure puzzles using Adventure as an example.

At this price it really is too good a chance to miss, so look out for similar bargains.

Classics?

It is very easy to keep talking about what we call "classic adventures" and one tends to think of other classic selections – the works of Charles Dickens or Daniel Defoe in the pure literary sense, Isaac Asimov's Foundation trilogy and Van Vogt's Weapon Shops in the field of science fiction.

What are classics? Surely those that either made their mark by being the first or those that have stood the test of time and can, many years later, still hold the interest of the reader or in our case the player. What do you think? Write in and tell us what would be your 10 adventure games that should qualify as classics.

Remember this is not quite the same as the Top 10 adventures, this selection has got to stand the test of time and possible replay years later.

There will be a small prize of software for the most interesting choice of programs. Please keep the reasons for your choice fairly brief – I have only 24 hours in each day to read them.

Down to the woods . . .

How is your tree recognition? Lost in Sherwood Forest, can you find your way out? You need not know the difference between oak and elm but some sort of pattern recognition comes in useful in Robin of Sherwood from Adventure International.

Although this game has been out for some time, the start of yet another TV series is bound to renew interest in anything in Lincoln green. I could watch Judy Trott (Marion) all day anyway and with that mystical blue make up!

An avid follower of the series, I wondered if the computer game would be a big let down. The answer fortunately is no. Adventure International has a fair reputation for its games and this one follows the normal pattern.

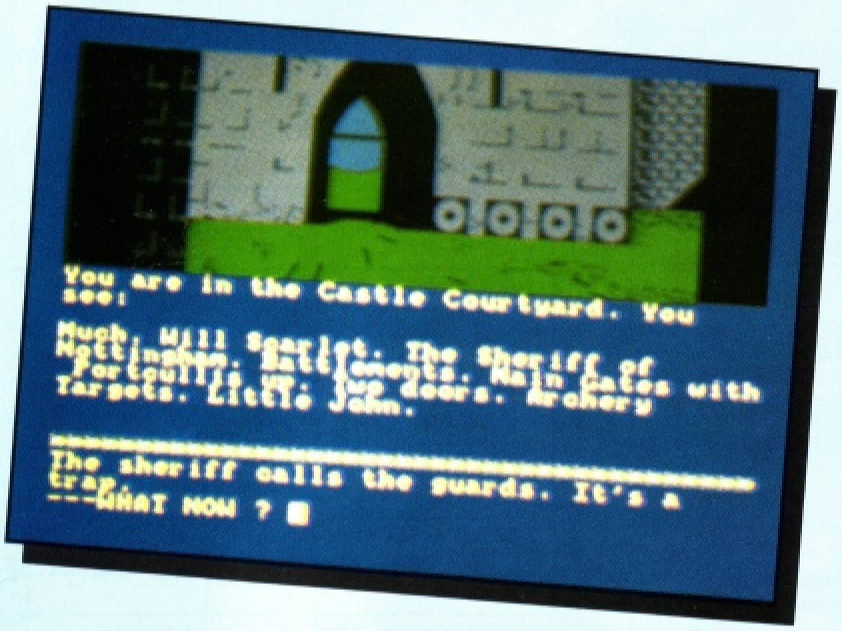
Loading takes some time, as would be expected for a game of this size, but loading in data from a saved game is quite fast. This is darn useful, as all the initial options presented by the game seem to end in disaster.

The graphics are good and for the most part very clear with the impression of good detail. They are drawn on the screen very quickly, which is a good thing because you cannot turn them off.

Once loaded, your first task is too get Robin and his merry men out of the dungeon at Nottingham Castle. For those who get fed up trying to do this the hard way, the instruction leaflet reveals all . . . well almost all.

You may feel slightly frustrated for a few minutes but perservere and do not forget to examine things/people as you progress. Having escaped from the dungeon, you now have to get out of the castle.

In conquering this first little puzzle, you will already





have started to feel out how Adventure International has set up its input command interpreter. You do not have to "Open doors" and then move through them, all that is needed is "go door, go battlements, go window, and so on, and the rest follows naturally.

No response

Some programs give a response if they do not recognise a word – here they are ignored completely. Beware of giving an instruction and believing it has been carried out because there is no response to the contrary.

Even though only the first four letters of a word are necessary for the program to know what you are talking about, check that your spelling is correct. "Exam gard" instead of "Exam guar" (examine guard) will elicit the standard response that "nothing special is seen" and examining things is important!

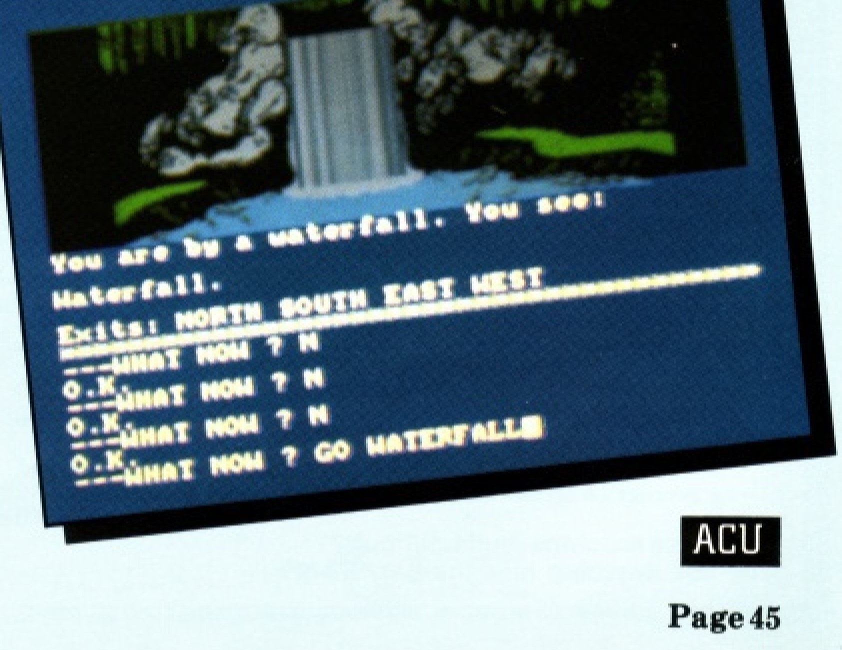
All the events portrayed in this adventure are related to various episodes and places seen in the earlier TV series. Once out of the castle you will come face to face with Herne the Hunter who will tell you that you must find the six Touchstones of Rhiannon and return them to their rightful place.

Once you have left Herne you find (or lose) yourself deep in Sherwood Forest. There are 53 locations with a description saying that you are in the forest – and nothing else. Just reach for your pencil and paper – all is not quite the maze it first appears – hence the earlier reference to pattern recognition.

You will find various places that obviously call for more careful exploration and of course here lies the crux of the game. Other characters appear from time to time and some of these may be requested to follow Robin and lend much needed aid at critical moments.

The sequence of events is important, so SAVE fairly often in case you later find you need to tackle things in a different order. Altogether an enjoyable game that should keep beginner and expert out of mischief and pleasantly frustrated for some time.





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ON THE SHELF

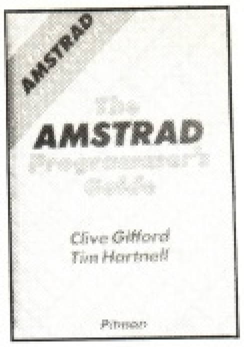
Our resident bookworm Jeremy Vine looks at the latest releases

As usual the books reviewed here are a mixed bag and encompass a wide area of ideas. The more books I look at, the greater my cynicism.

This month's bag of goodies reiterates my feelings about book covers and their glorious descriptions of the contents within. In fairness to the authors, the covers are often outside their control and the descriptions can sometimes be written by third parties.

One thing that does please me is that the number of books available for Amstrad machines is still as large as ever and that can only be to the good of you, the reader.

Greater choice brings with it the problems of sorting the wheat from the chaff but there is plenty of good material around. In the early days of home computing, discerning readers were few and far between. That situation has rapidly changed. Authors beware . . .



The Amstrad Programmer's Guide
Clive Gifford and Tim Hartnell
Pitman £6.95 176pp

Tim Hartnell's latest work, written with Clive Gifford, is equally relevant, according to the cover, for the 464, 664 and 6128 machines.

The book is an obvious attempt to provide something for everyone and, depending on your point of view, you may well like the idea.

For instance, the authors provide a sweeping introduction to "the rudiments of machine code". A commendable idea except the "rudiments" turns out to be less than a page and a half of information about PEEK, POKE, and CALL commands and is of absolutely no use to a beginner, for whom the book will provide the biggest attraction.

The book is a conglomerate of "let's teach Basic" and "101 rip-roaring games for your Amstrad". It wouldn't be half as bad if the authors had concentrated on one idea or the other but instead seem determined to throw in anything that had any relevance to the Amstrad.

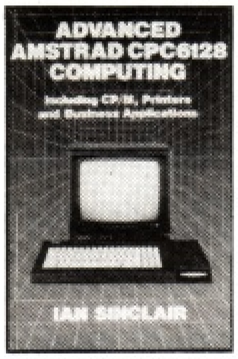
The first 10 chapters teach Basic programming and are then followed by chapters about the cassette and disc drives.

It's here that the authors include a look at CP/M, a fine example of how to fill up space with meaningless material. A diagram of the CP/M store map is included and to the readership of this book would mean as much as Egyptian hieroglyphics.

From this point on the book begins to show its true colours and descends rapidly into as many short programs as the authors could bear to write. The range of graphics, sounds and, of course, games are covered and if you like to just type in programs without knowing what you're doing, then this book is fine.

The book claims to teach you how to program like a professional, but it barely teaches and the programs contain too few detailed explanations to make them useful.

As you can guess I didn't like this book one iota. For beginners and those who seriously want to improve their programming there are far better guides around.



Advanced Amstrad CPC6128 Computing
Ian Sinclair
Collins £9.95 170pp

This book is aimed at the more competent micro user and looks specifically at the 6128 machine. In particular, Sinclair concentrates on CP/M and business applications.

Chapter one explains all about disc systems and contains many useful answers to commonly asked questions.

Backing up discs is the subject of the next chapter. Although this seems to be a straightforward action it is often full of pitholes and misunderstandings when using CP/M.

One of the more confusing commands to the uninitiated is PIP. Sinclair does explain its use though not in sufficient depth. PIP is one of the most common and potentially useful utilities provided and I felt disappointed that a more thorough coverage of this command was not included.

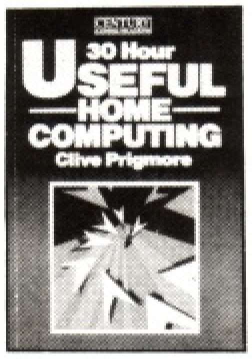
After a brief glance at the remaining utility commands Sinclair proceeds to familiar territory with a chapter on filing from lower case. It paves the way for chapter five, where the obligatory database program is listed with a thorough explanation of how the program works.

Chapter eight covers the subject of printers which is always a problem to so many people. The final chapter is devoted to the extra memory found in the 6128 and will be of interest to those who can make use of the additional workspace.

Finally, there are several appendices listing CP/M Plus control codes, advising on TV receivers and error trapping programs.

It turns out that Ian Sinclair has produced a book which doesn't quite complete the business picture but attempts to appeal to a wider audience.

Perhaps it would have been better if the book aimed itself purely for the business and serious application user covering CP/M in greater depth. However, that little gripe aside, the book is well presented and is readable enough to attract those who can't fathom their way through the user guides.



30 Hour Useful Home Computing
Clive Prigmore
Century Communications
£8.95 176pp

The title of this book shouldn't be confused with that of the best selling teaching series, 30 Hour Basic, written by the same author.

This one falls into the general computing category and is one of those books dedicated to telling anyone who is interested about all the different applications that can be run on a home computer.

It can best be described as the hitchhiker's guide to software for home computing. The book covers the usual array of applications such as word processing, databases, spreadsheets, stock control and the like. If you don't understand the jargon employed in new technology, and are easily confused by words like "formatting" or "justified", then this could be the book for you.

I found it hard to match up this book with the 30 Hour concept of Mr Prigmore's previous book and could only conclude that the 30 Hour title was inserted for sales mileage. It's not aimed at one computer but across the broad spectrum of the micro market and in general seems to meet its task well.

There's not really anything specific for Amstrad owners but as a light read about micros and what they can and can't do, you could do a lot worse.

Clive Prigmore in his introduction says that the key word in the title of this book is "useful". How useful a book like this is to you depends on your knowledge of computing.

If you have a little idea of the jargon employed in various pieces of software and can't tell a database from a spreadsheet, then 30 Hour Useful Home Computing is for you.

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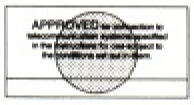
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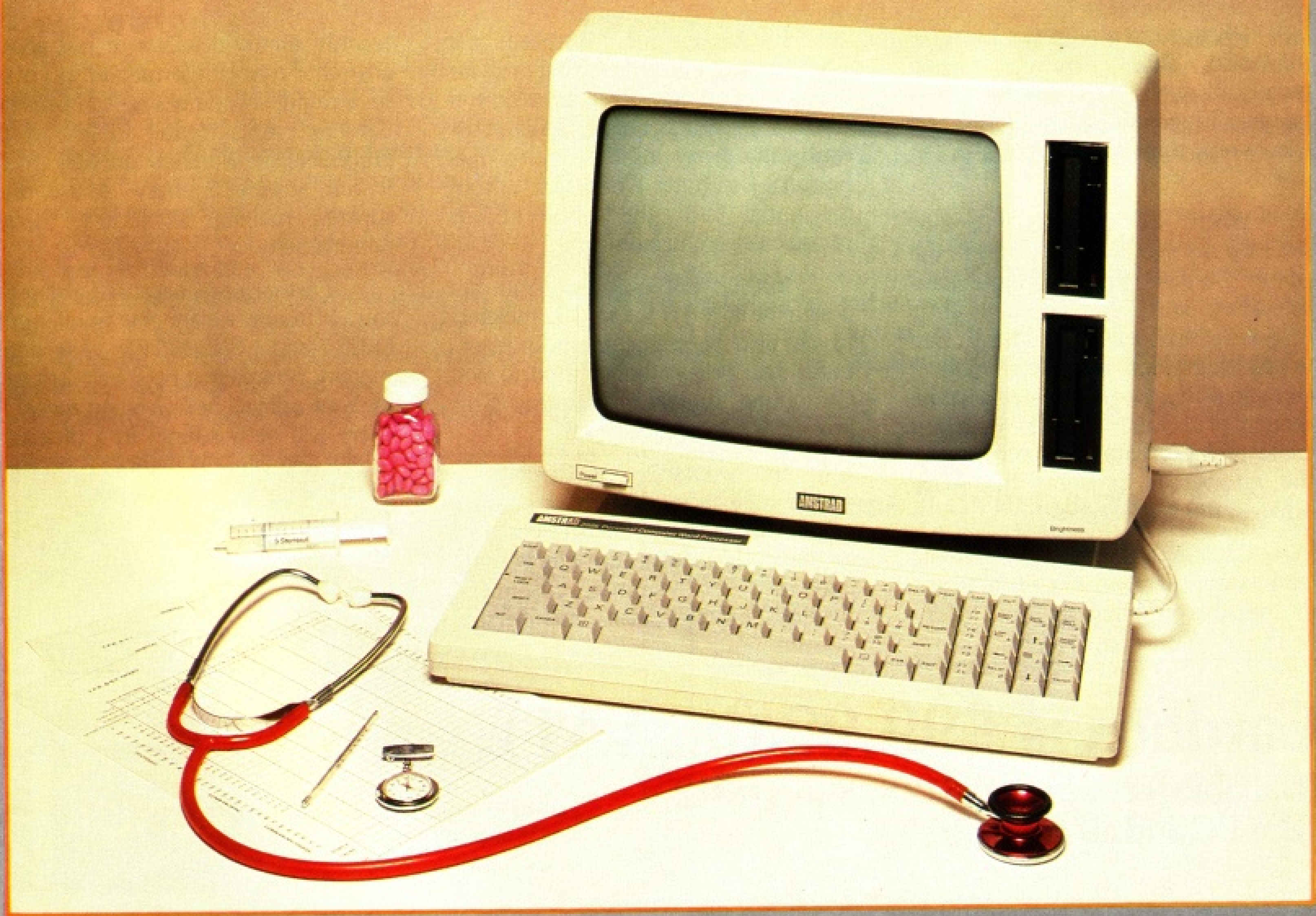
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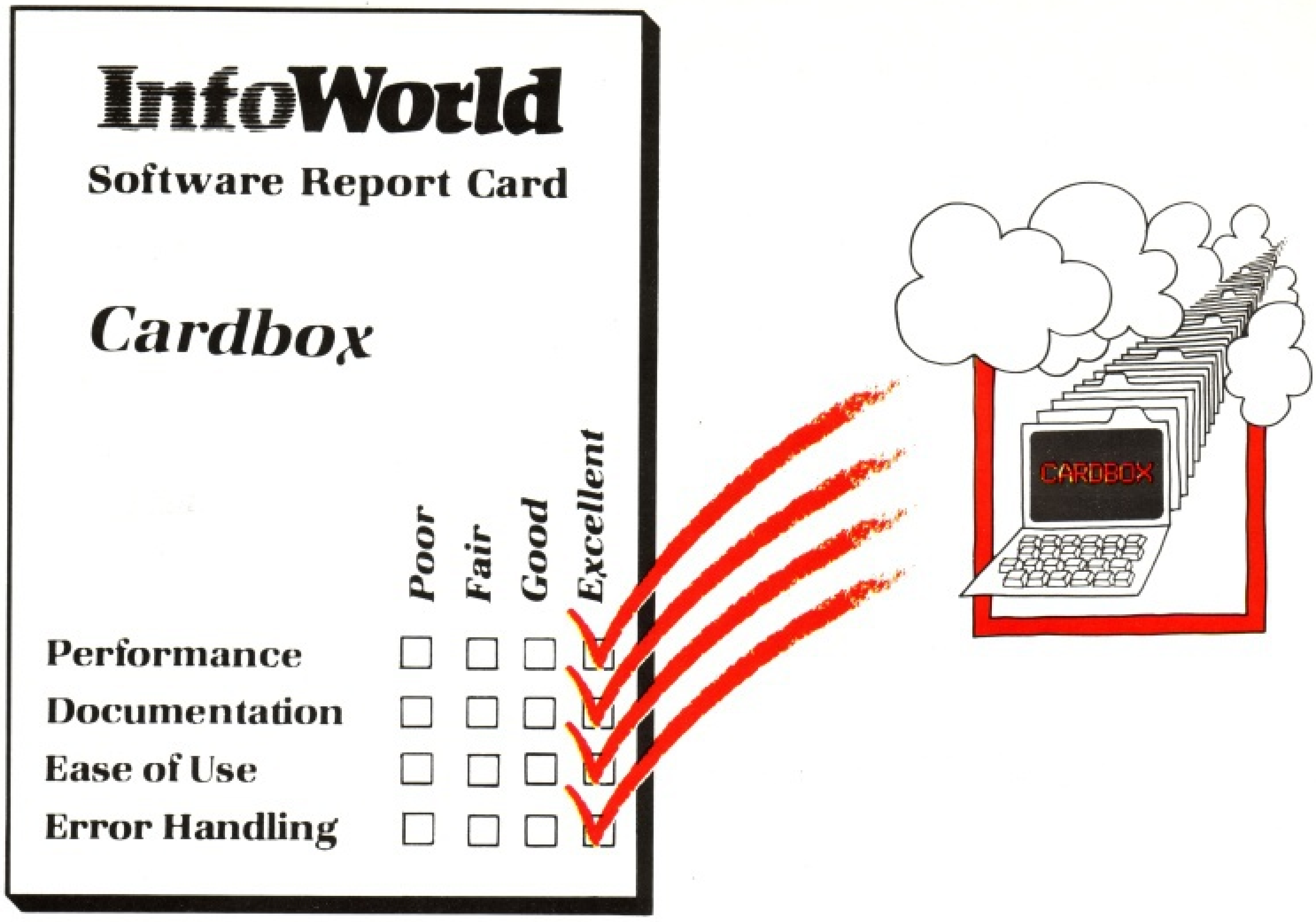
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June 1986
Volume One
Number Seven

What's up Doc? An 8256 case study

Plannercalc: A spreadsheet for the organised

More hints on Locoscript





Why settle for less?

OK – so you've never heard of InfoWorld. That's hardly surprising because it's published in America. It does however happen to be one of the most widely-read software magazines in the world.

When we launched Cardbox several years ago, we sent a copy to the editor. Because the Americans have software products coming out of their ears, it was an honour when he decided to publish a review for us. Even more of an honour when we discovered what he thought of it! Over the past five years you could probably count on your fingers the number of products that have achieved this sort of acclaim.

Cardbox is simply an electronic card-indexing system – a replacement for the cards on your desk.

It's famous for the speed, and flexibility with which it can find cards for you. Unlike the cards on your desk, you can have any number of keywords on the card, anywhere in the entire file. Personal Computer World said "...from my initial tests, the fastest of any package I've evaluated so far..."

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Amstrad Business Computing

It wouldn't be overstating the case to refer to the success of the Amstrad computer range, particularly the 8256, as a phenomenon. But most of the users are new to computing – the price of the new machines has tempted them out in to the murky and unknown waters of a world dominated by overpaid computer professionals and young children bent on destruction of whole galaxies.

The Joyce owner has some great purpose for that shiny new machine – anything from writing letters to granny to controlling vast and complex stocks.

While an Amstrad may represent a most cost effective way to move into computing, it is certainly not the easiest. To begin with CP/M is a very respectable and powerful operating system but it doesn't smile very much. The more powerful operating systems for the IBM machines provide a friendly cushion between the user and the machine's operating system in the form of pretty graphics, mice and pull down windows. But don't let that get you down – IBM's don't have *ABC*.

Our job is to provide the information and inspiration that can make life with an Amstrad business machine both fun and functional.

In my experience you don't need to be an expert to use and enjoy computers. My quest for computer knowledge was fertilised by curiosity and enthusiasm for the little darlings, and satisfied by the outpourings of experts who seem only too willing to depart some gem to a patient bystander. Curiosity is probably the most important asset an aspiring computer literate could have – that and the courage to have a go.

Future events

It is the function of a business magazine to discuss matters pertaining to the world commercial. *ABC's* brief goes a little further in that we will come to concentrate on everything that lives and breathes in CP/M, and anything else we can get our hands on.

For example, now that you have all got smart new CP/M computers you can begin to enjoy the benefits of the free software held on the public domain libraries. From next month Rod Smith will review in detail the software available from these sources. Such is the diversity of the material that you could find yourself collecting the stuff for a hobby.

Accounting is one of the most popular uses for computers so we will be paying special attention to this area, but in an active way. To begin with we will devote space to an accounts surgery where accounting in general – and computerised accounting in particular – will be discussed. If you have a problem then write to *ABC* and mark your letters "The accountant".

But as well as the forum we shall bring you case studies of users. Our first is next month when we look over the shoulders of a hairdresser who is computerising her accounts – an ambitious enough project especially when you think that her only previous use for a computer was to play Fruity Frank.

Some publications are content to simply review a product when it comes on to the market – *ABC* will go further. Once we have reviewed it we shall seek the opinions of those who actually have to use it, and we will explain the purpose for an application, in computer and non-computer context.

For example, we are forever being told that spreadsheets are the bees knees when it comes to financial modelling, but what is financial modelling, and how should you apply it to help run a business? Find out next month.

ABC is a user's magazine – written by users for users. Of course we seek the advice of experts, but we make sure we know what they are on about before we print their ramblings.

The most important thing is that our readers should control *ABC*. If you are using a particular piece of software let us know what you think of it. If you think it's great please tell us why, but if you hate it we want to know about that as well. The most valuable source of information is the collective opinion of other users.

Jeremy Spencer

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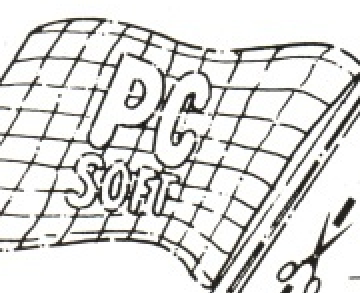
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ABC FORUM

Who's counting?

We are a couple of writers who rely on commissions to make a living. The PCW8256, our first dabble in modern world-churning technology, has revolutionised the speed and presentation of our output. Naturally we are made up with it, as they say in our part of rural Sussex.

From our point of view, though, Locoscript has one serious deficiency. Many publishers pay by the word and they can be pretty choosey about the exact number of these discrete money-earning nuggets they require.

But surprisingly Locoscript does not include a word count among its many talents, which means we have to do the adding up in the old-fashioned way.

Is there anyone out there who could write a program, using the software supplied, to perform this vital task?

In the April issue Diana Lunt says she wants to give her PCW a name, and who can blame her?

We are so impressed by our Amstrad's amazingly low price that we based its name on that. We translated £399 into time – as time is money – and discovered that in the year AD 399 Anastasius I became Pope, so Anastasius it is.

For our second machine we tried 399 BC. That year saw the death of Socrates, described so eloquently by Plato in his Phaedo. Our Phaedo may bleep a lot, but at least it does not bark!

Jean and Theodore Rowland-Entwistle,
Hastings, Sussex.

ABC: *I hear rumblings that Locoscript may one day get its very own word count routine but until such a thing happens you are a little stuck.*

As far as I know there are only three ways to get such a routine. 1. Write one, 2. Buy some other wordprocessing software that has its own word count routine and 3. Get in touch with a public domain library because such a beast lives on their shelves.

Look out for the series on PDL starting soon. Some publications are more interested in the number of lines than the number of words. If you use a template which has around the same number of characters between the margins as a column in the magazine – this column is about 39 characters wide – you get an approximate line count.

As for naming your Joyce, well your letter just begs for a silly competition of some sort. And by the way – by which system did you derive the name Theodore Rowland-Entwhistle!

Dream becomes a nightmare

After some years on Tandy, Compaq and IBM, we bought the PCW8256 to process words and run spreadsheets for a small business.

We also bought Supercalc 2, and it ran like a dream until we tried to change the typestyle using SETUP in the OUTPUT mode, when it refused to accept the printer codes.

We ran the verification program which insisted that there were errors in SC2.COM.

We returned the disc to Newstar, who promptly sent us a fresh disc. This suffered from the same fault, and again verification suggested that there were errors.

We again returned the disc which was promptly replaced but to our dismay it suffered the same problems.

We are now in a quandary. Could it be the hardware or the system? Are we using the wrong codes? Has anyone else had this problem?

We love the PCW. Locoscript is excellent. Newstar have been courteous and prompt in their attention. Supercalc is ideal for our purposes, but we would like to print in pica. Can anybody help us please?

R. Jones,
Welshpool, Powys.

ABC: *The verify program on Supercalc is intended to check an uninstalled version of the program. However, the versions supplied are pre-installed either for the PCW8256 or the CPC6128 and so it will report an error anyway.*

Ideally, the verify program wouldn't be supplied in the first place as it only serves to confuse.

As far as sending codes to the printer goes, it really does work. For example if you type [ALT] 0 using SETUP in output mode, you may select condensed print. Similarly to change to elite typestyle press [EXIT] followed by M (make sure it's in upper case).

RAM at the double

The letter "Socket to 'em", together with the advertisement by RAD Systems of Harrow and a recent item in Personal Computer World magazine leave little doubt that the Joyce's RAM could be doubled to 512k at very little cost.

Is there any possibility of this being available in a way that will not invalidate Amstrad's warranty?

Having recently had a second disc drive fitted to my 8256, I was struck by the apparent identity of physical dimensions between the single-sided, single density drive in drive A and the double-sided, double density drive fitted in Drive B.

Are the two drives identical in overall dimensions? If so, could a DSDD drive be fitted as drive A (in place of the SSSD), and would any modifications be needed to the operating system and drive interface? It would be quite some machine, a Joyce with 512k RAM and two 720k disc, wouldn't it?

Dennis Powell,
Safron Walden,
Essex.

ABC: *To answer – No. Yes. No. Yes. Yes. To be more helpful – Amstrad will not honour their warranty if you, or any unofficial bod pokes around in the back of your Amstrad, and indeed why should they?*

There are some companies who advertise a Joyce-fattening service and then offer a warranty as well, but you have to ask yourself whether they are going to be around long enough for you to collect.

My opinion is that the machines are reliable enough not to need a warranty and so long as the fattener knows what he is about there shouldn't be any problems. My own Joyce is a home-fattened type and seems very happy.

As to putting a double density drive in the place of the single density – well it could be done but there are a lot of very difficult technical problems to be surmounted.

It would need some major changes to the software you get with the 8256. Are these Joycesters never satisfied?

Clubbing together

Having used a PCW8256 successfully for more than three months we have decided to start a PCW club to enable other users to get together through the pages of a club newsletter.

Would you be kind enough to let PCW users know through *ABC* that if they write to me at the address below we shall be pleased to send details of our club.

A sae please to:
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ABC: *More than pleased to be of service. Perhaps you might let ABC join as well so we can be kept up to date with your goings on.*

ABC Forum is for you to air your opinions – not just grievances but praise as well. If you have any hints and tips let us know by writing to ABC Forum, 169 Kings Road, Brentwood, Essex CM14 4EF.

ABC PROGRAMMING

Creating custom-built databases

A database is an essential piece of software for the disorganised user. Stuart Cole looks at how to go about writing your own.

After word processing, the most likely serious use you'll want to make of your computer is to keep a database. You might call it an address list or photo index, but to the computer it's a database.

You can of course buy a database to run on your computer – there are many available for Amstrads – but the problem is that they are not usually flexible enough. So you have to organise your data to fit the program's view of life or learn a whole new computer language before you can so much as type in a telephone number.

But PCW 8256 and 8512 owners already have a powerful tool for building databases which do just what they want – Locomotive Software's Mallard Basic.

In fact all Amstrad computer users can use Mallard since it is also available for the CPC464 (with a disc add-on), CPC664 and the CPC6128.

What's so special about Mallard Basic? First, a digression on how Basic saves data.

Most Basics have the ability to store information in an array – text in a string array and numbers in numeric arrays. So, using an array carefully, you can save names and addresses or whatever.

For example, to write a simple name and address program you might choose to have two arrays. The first, say *NAME$(100),* would hold the names, and the second, say *ADDRESS$(100,5),* would hold the addresses. Then to add a name and address you would find an empty slot, say number x, and store the name in *NAME$(x)* and the five lines of address in *ADDRESS$(x,1)* to *ADDRESS$(x,5).*

You would need to keep track of empty slots, maybe simply by keeping a high water mark of used slots.

Looking up a name would involve scanning the used *NAME$* elements until the end or until its value matches the name being looked up.

Both the Basics which come with Amstrad computers let you save your data on to disc (cassette on a 464) and read it back in again the next time you run the program.

So in our example above the two arrays plus the high water mark could be saved to disc after adding new names and addresses, and would have to be read in before anything could be looked up.

There are several problems with this approach. It is fairly slow when your database gets big. You have to transfer a lot of data to and from the disc, searching for the names is a slow process, and you are limited by the memory size of the computer.

In the above example, using one string of 30 characters for each name and five lines of 25 characters for each address, 200 addresses will need 35k.

You can of course get round some of these problems by writing programs to speed up searching and to handle larger databases in chunks. This is really a waste of effort, since discs and their data can in fact be used more effectively than we have seen so far.

Random files

Most business Basics – such as the ubiquitous Microsoft Basic and of course Locomotive Software's Mallard Basic – have more advanced capabilities to let you structure the way you save data on disc.

This is called random file handling and means just what it says. You can reserve an area of the disc and choose parts of that area at random to write your data to and read it from.

In other words it is like an array on the disc. Actually, it's a bit more flexible than this because Basic has commands

```
10 BUFFERS 6
20 keyfile=1: recleng=122
30 IF FIND$("ADDRESS.DAT")="" THEN CREAT
   E 1,"ADDRESS.DAT","ADDRESS.KEY",2,rec
   leng+2 ELSE OPEN "K", keyfile, "ADDRE
   SS.DAT", "ADDRESS.KEY", 2, recleng
40 FIELD keyfile, 20 AS namefld$, 20 AS
   addrfld1$, 20 AS addrfld2$, 20 AS add
   rfld3$, 20 AS addrfld4$, 20 AS addrfl
   d5$
50 DIM pername$(5)
100 '
200 ' MAIN PROGRAM LOOP
300 ' =================
400 '
500 INPUT "Add, Retrieve or Quit: Type i
    nitial letter "; keyread$
550 keyread$=UPPER$(keyread$)
600 IF keyread$="A" THEN GOSUB 3000 ELSE
     IF keyread$="R" THEN GOSUB 4000
700 IF keyread$ <> "Q" GOTO 100: REM - l
    oop until "Q" is typed.
800 CLOSE keyfile
900 END
1000 '
1100 ' Subroutine to read Name and Addre
     ss
1200 '
1300 LINE INPUT "Name "; pername$
1400 FOR i% = 1 TO 5
1500     LINE INPUT "Address Line "; per
     addr$(i%)
1600 NEXT i%
1700 RETURN
2000 '
2100 ' Subroutine to display Name and Ad
     dress
2200 '
2300 PRINT pername$
2400 FOR i% = 1 TO 5
2500     PRINT peraddr$(i%)
2600 NEXT i%
2700 RETURN
3000 '
3100 ' Add a record to the database
3200 '
3300 GOSUB 1000: REM - read in name and
     address
3400 GOSUB 2000: REM - display it to che
     ck it's OK
3500 INPUT "Is that correct "; nameok$
3600 IF nameok$ = "N" GOTO 3030: REM - l
     oop and ask again if not OK
3700 LSET namefld$  = pername$
3710 LSET addrfld1$ = peraddr$(1)
3720 LSET addrfld2$ = peraddr$(2)
3730 LSET addrfld3$ = peraddr$(3)
3740 LSET addrfld4$ = peraddr$(4)
3750 LSET addrfld5$ = peraddr$(5)
3760 rc% = ADDREC (keyfile, 2, 0, pernam
     e$)
3770 IF rc% <> 0 THEN PRINT "ADDREC FAIL
     ED, Return Code "; rc%
3900 RETURN
4000 '
4100 ' Retrieve record from database
4200 '
4300 INPUT "Type name to look up"; perna
     me$
4400 rc% = SEEKKEY (keyfile, 2, 0, perna
     me$)
4410 IF rc% <> 0 THEN PRINT "Failed to s
     eek ";pername$,"RC ";rc%: RETURN
4420 GET keyfile
4430 pername$ = namefld$
4440 peraddr$(1) = addrfld1$
4450 peraddr$(2) = addrfld2$
4460 peraddr$(3) = addrfld3$
4470 peraddr$(4) = addrfld4$
4480 peraddr$(5) = addrfld5$
4500 GOSUB 2000: REM - display retrieved
      record
4900 RETURN
```

Listing 1

to put different sorts of data into adjacent areas of disc.

So you could organise your disc into a sequence of areas for saving names and addresses and only read and write the ones you need. Conventionally we call each of these names and addresses (or whatever) a record.

It is here that the Basic on the CPC range shows its origins as a home computer's Basic, and you need to equip them with a business style Basic running under CP/M to use discs effectively. This can be done for about £50 for Mallard or £110 for Microsoft.

Using random files for your database is still a bit messy though, as you need a scheme for remembering which record (name and address) on the disc is the one you want to read and write. Basic uses a simple numbering scheme, so you could use the computer's memory to save an index of who corresponds to which record.

In our names and address example this would mean keeping the array of names, and linking each element with the record on disc holding the matching address. This largely avoids the memory limitations of the earlier approach, but we're still up against the problems of having to load in, save and search the index. This is where the power of Mallard Basic comes in.

Enter Jetsam

Mallard Basic offers you a more sophisticated form of random file handling, where rather than memory it uses another file – staggeringly called the index file – to hold an index of the records holding your data in the data file.

In fact the whole thing is done using a sophisticated sort of index that reduces the effort your computer has to use to find a record. Technically it is called a B*-tree. We call the pieces of information used in the index keys, and the type of file handling Mallard Basic does is called keyed file handling. The Mallard version is called Jetsam.

Keyed file handling

In fact the features which Mallard's keyed files provide can be found on a number of other programming languages and mainframe computers.

The very popular versions of Cobol from Micro Focus include keyed files but these features on their low priced CIS Cobol are actually neither as powerful nor as fast as Mallard's.

Also the operating systems on most mainframes have what is called Index sequential access method (ISAM). Broadly, this can provide similar features to Jetsam.

Mallard lets you deal with the data file and the index file as though they were one. You use standard Basic commands to control how your program works, but special commands to actually read and write keyed files. In fact most of these special commands are similar to standard Basic's file handling commands – the differences are when you want to flip through the index to see what's there.

The easiest way of illustrating how it all works is to show how to write a simple program. Afterwards those of you with Mallard could find out how easy it really is by writing your own database program – after all, if you don't succeed you can always spend £395 and buy a copy of DBase II.

A simple database – name and address list

A database can be as simple or as sophisticated as you like. This month I'll concentrate on the simplest sort, and next month I'll show you the bells and whistles. So this program won't try to be clever by vetting the data or using the smallest space to save it.

I will go through the steps of writing the program, giving the program in sections as the various features are discussed. Listing 1 is the complete program, so you can see how it all fits together.

First steps – think about the data

In this program I'll assume a name to be a simple character string of no more than 30 characters, and the address five lines of 20 characters – also held as character strings.

So I'll hold this information as a string variable *pername$* and a string array *peraddr$(5)*.

Before going anywhere near the disc files it's a good idea to write the

subroutines to read in the name and address from the keyboard and display it on the screen. If you've got those working you can use them to test the keyed file handling. So we have:

```
1000 '
1100 ' Subroutine to read Name and Addre
     ss
1200 '
1300 LINE INPUT "Name "; pername$
1400 FOR I% = 1 TO 5
1500      LINE INPUT "Address Line "; per
     addr$(I%)
1600 NEXT I%
1700 RETURN


2000 '
2100 ' Subroutine to display Name and Ad
     dress
2200 '
2300 PRINT pername$
2400 FOR I% = 1 TO 5
2500      PRINT peraddr$(I%)
2600 NEXT I%
2700 RETURN
```

Now write the main program to loop round adding names to the data file using these subroutines.

Second – work out the main program

The program will simply ask the user to type a character A, R or Q and will choose whether to add a record to the database, retrieve a record by just typing its name, or quit the program. This is a very straightforward main program which will use two more subroutines – one to add a record (at 3000) and one to retrieve a record (at 4000).

The program could be more clever in its vetting of the input, maybe converting lowercase letters to uppercase, but I don't want to obscure the Jetsam part with such detail. The main program is:

```
100 '
200 ' MAIN PROGRAM LOOP
300 ' =================
400 '
500 INPUT "Add, Retrieve or Quit: Type i
    nitial letter "; keyread$
600 IF keyread$="A" THEN GOSUB 3000 ELSE
     IF keyread$="R" THEN GOSUB 4000
700 IF keyread$ <> "Q" GOTO 100: REM - l
    oop until "Q" is typed.
900 END
```

The next thing to do is to write the add and retrieve subroutines – still not using Jetsam – and add a DIM command at the start to define the *pername$* array:

```
50 DIM pername$(5)
...
3000 '
3100 ' Add a record to the database
3200 '
3300 GOSUB 1000: REM - read in name and
     address
3400 GOSUB 2000: REM - display it to che
     ck it's OK
3500 INPUT "Is that correct "; nameok$
3600 IF nameok$ = "N" GOTO 3030: REM - l
     oop and ask again if not OK
3700 PRINT "This is where we'd add recor
     d to database"
. . .
3900 RETURN


4000 '
4100 ' Retrieve record from database
4200 '
4300 INPUT "Type name to look up"; perna
     me$
4400 PRINT "This is where we'd retrieve
     record from data base"
4500 GOSUB 2000: REM - display retrieved
      record
. . .
4900 RETURN
```

Now, with the structure of the program sorted out, we can concentrate on Jetsam.

As with all file handling in Basic, you have to start off by OPENing the files before you can write or read records. You can actually achieve quite a lot with the OPEN command so this month, to keep things straightforward, you'll have to take some magic numbers on trust. So we'll add the following commands at the start of the program:

```
10 BUFFERS 6
20 keyfile=1: recleng=122
30 OPEN "K", keyfile, "ADDRESS.DAT", "AD
   DRESS.KEY", 2, recleng
```

The BUFFERS command reserves some of the memory for use by Jetsam. You must always put a BUFFERS command at the start of the program, but next time I'll say more about its use.

In the OPEN command, K means this is the keyed version of OPEN. ADDRESS.DAT and ADDRESS.KEY are the two files which will hold the data and the index which together make up the database.

The two variables *keyfile* and *recleng* will always hold the same values. This just makes the program that bit more readable. *recleng* holds the length of one of our name and address records (6×20+2, 20 for the name and five lots of 20 for the address – the 2 is magic but you always have to add it!) and *keyfile* is the number I have chosen to use to refer to the database whenever it's used in the program.

Basic also needs to know when we've finished with the database, so I'll add a CLOSE command just before the end of the main program.

```
800 CLOSE keyfile
```

See how the fixed variable makes the program readable. In fact when using Jetsam it is very important to close the database files properly.

The way it works means that there are times when the index and the data are slightly out of step. If you were to stop at that point, the next time you used the database you might get incorrect results. Rather than let you run the risk of such (possibly unnoticed) errors, Jetsam won't let you use a database at all unless you closed it properly the last time. So be careful!

So with OPEN, CLOSE and dire warnings behind us we can actually use the database.

Adding to a database

Above, the program avoided the issue when it got to line 3070, adding a record. Now we'll fill in the gap.

Jetsam's keyed files are used in a very similar way to random files.

You have to first use a command to define the layout of the records in the datafile. This is called defining the record's fields, and uses the FIELD command. Second, you fill the fields with your data. Finally – and this is where random records differ – you write the record on to the disc. So let's look at the three stages in detail.

Defining FIELDs

The FIELD command starts with the number by which we are referring to the database, and is followed by a number of field definitions.

Each field definition is "length AS name", where length is the number of characters in the field, and name is the string variable we are going to use for this field. The FIELD command should usually go after the OPEN, but before the loop which reads and writes the records.

So the FIELD command we need is:

```
40 FIELD keyfile, 20 AS namefld$, 20 AS
   addrfld1$, 20 AS addrfld2$,
20 AS addrfld3$, 20 AS addrfld4$, 20 A
   S addrfld5$
```

Unfortunately, we can't use an array in a field definition, but next month I'll look at some neat ways we can get round this problem.

Filling FIELDs

Another problem with field string variables is that although they look like ordinary string variables, they can't be given a value in an assignment. That is, taking *addrfld2$* from our above exam-

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ple, you cannot write *addrfld2$*= "address". Instead we have to use a special command which puts information into a field string variable. There are several possible commands – the one I'll use is LSET (a mnemonic for Left aligned SET), which puts the information into the variable padded out with spaces.

The LSET command is written as LSET followed by the assignment. So for example:

```
LSET astring$ = "123abc"
```

will put 123abc into the string variable *astring$*, padding out with spaces to the full length of *astring$*.

The database program will need six LSET commands to fill the six fields. They are:

```
3700 LSET namefld$  = pername$
3710 LSET addrfld1$ = peraddr$(1)
3720 LSET addrfld2$ = peraddr$(2)
3730 LSET addrfld3$ = peraddr$(3)
3740 LSET addrfld4$ = peraddr$(4)
3750 LSET addrfld5$ = peraddr$(5)
```

Writing the record to disc

Having filled the record all we need to do is add it to the database. For this we use a special command for keyed files, ADDREC. This both puts the record into the data file and puts the index entry into the index file.

We need to give the ADDREC command the reference number of the database and also tell it the index entry – the key – for this record. As we're using the name as the key for our records we will use *pername$*.

The command is:

```
ADDREC (keyfile, 2, 0, pername$)
```

The numbers 2 and 0 are to do with more sophisticated use of Jetsam, and will be explained next month.

In fact this is not quite enough. This is a very powerful command and a lot can go wrong, for example the disc might be full. Jetsam gives you a way of checking all is well.

Commands like ADDREC are actually functions – that is they produce a value as well as performing their task. This is called the return code. For now it is sufficient to say that a return code of zero indicates success and a non-zero return code indicates failure. The full command is thus:

```
3760 rc% = ADDREC (keyfile, 2, 0, pernam
     e$)
3770 IF rc% <> 0 THEN PRINT "ADDREC FAIL
     ED, Return Code "; rc%
```

which adds a record to the database and tests if the return code was zero.

And that completes the task of adding a record to the database.

Retrieving a record

Looking up a name in our database is also split into three stages. First look up the name in the index – this finds a record but does not actually read it. Next, assuming a record was found, you must get the record from the data file. Finally extract and display the data.

Looking up a name

This is the process of seeking a key in the index. It uses another special command called SEEKKEY.

We need to write:

```
SEEKKEY (keyfile, 2, 0, pername$)
```

which tells Jetsam to look in the index for an entry matching the string held in *pername$* and to remember which record this corresponds to in the data file. It does not actually read the record.

Once again we should more properly call it the SEEKKEY function, since it produces a return code like ADDREC. In fact it is identical in form to ADDREC, so the command is:

```
4400 rc% = SEEKKEY (keyfile, 2, 0, perna
     me$)
4410 IF rc% <> 0 THEN PRINT "Failed to s
     eek ";pername$,"RC ";rc%: RETURN
```

The subroutines stops short if the SEEKKEY failed for any reason. In practice such failures are usually because the user can't type and the name being looked up doesn't exist!

Having remembered the record we're looking for in the data file (called the current record), all that remains is to read it into memory.

Getting the record from disc

The SEEKKEY has told Jetsam which record holds the data we want. To read that data we need to read the record from disc and to split it up into the fields we originally saved.

To read the record we use the standard basic command GET. In fact GET can be used to read any sort of file and we'd usually have to say precisely which part of the disc we were referring to. But as we have done the seek (which remembers the record) Jetsam handles this for us. The command is:

```
4420 GET keyfile
```

Extracting the data

This is exactly the opposite of filling the fields. We need to use a FIELD command to split the record into fields and then use the field string variables.

The first FIELD statement is in fact good enough for both reading and writing the keyed file, so we don't need another one and can use the same field strings. The process of looking at the data is simplified as we can use field strings on the right of an equals sign in an ordinary assignment.

So the last few lines of the program we need to write are:

```
4430 pername$ = namefld$
4440 peraddr$(1) = addrfld1$
4450 peraddr$(2) = addrfld2$
4460 peraddr$(3) = addrfld3$
4470 peraddr$(4) = addrfld4$
4480 peraddr$(5) = addrfld5$
```

The database update program is now complete.

Creating the database files

Before we can use the database update program we need to create the database. The commands above all assume that the files ADDRESS.DAT and ADDRESS.KEY exist. So having written the program you need to save it on disc – say with the direct command SAVE "ADDRESS" – and write a short program to create the database files.

Once again we start with:

```
10 keyfile = 1: recleng = 132
```

but this time follow it with a command to create the keyed file. This is the CREATE command.

```
20 CREATE keyfile, "ADDRESS.DAT", "ADDRE
   SS.KEY", 2, recleng
```

Once again the 2 is a magic number, and will be explained next time.

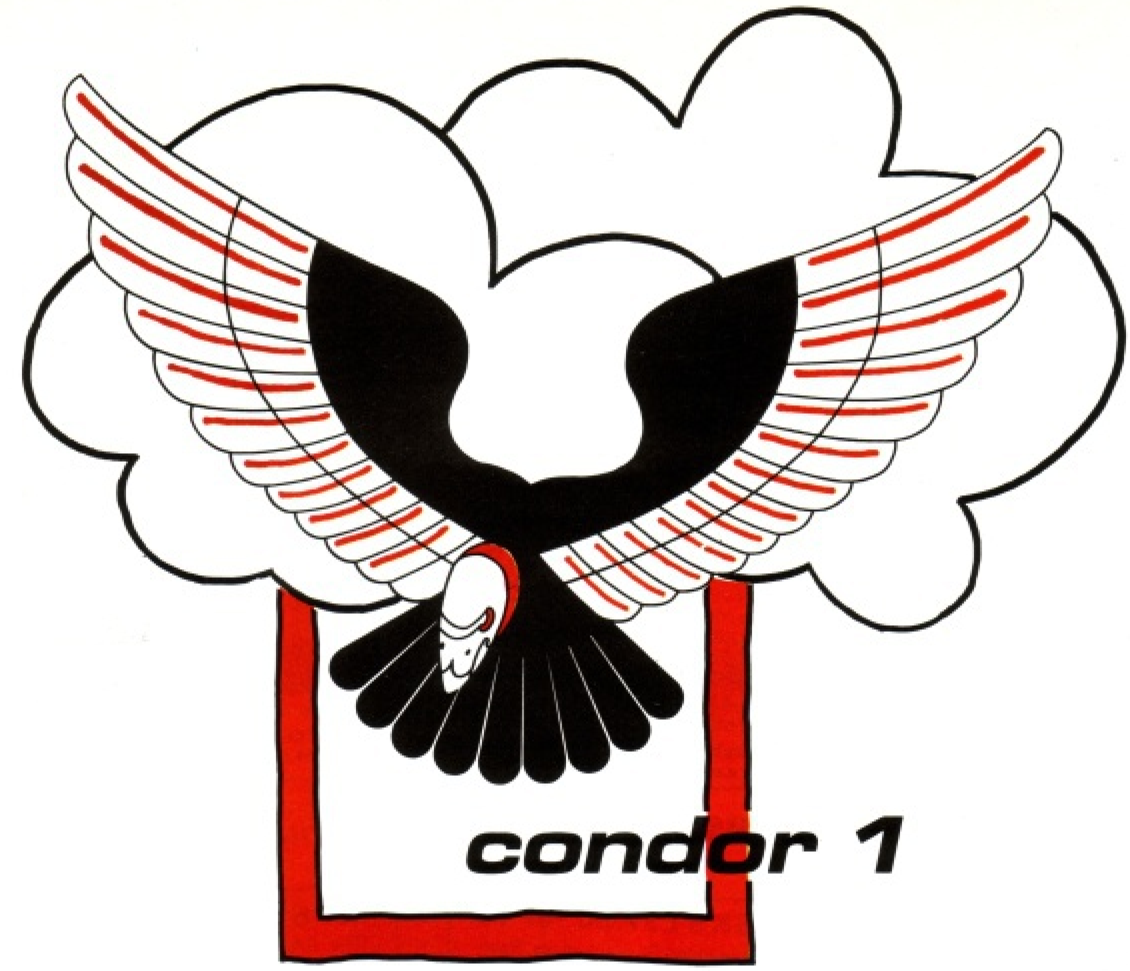
Next time

This program has left out a number of Jetsam's features. It also leaves out features you would expect in a database – deleting records, changing them and certainly vetting the input.

Also it should generally be made more user friendly, for example accepting lowercase replies to the various questions.

Next time we look at how to improve the name and address database.

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ENTER	Insert new data into a database
POST	Update entries in one database with those from another
UPDATE	Change entries in a database meeting specified conditions

Information Processing and Report Writing

COMPARE	Compare entries in two databases for (not) matching conditions and create a RESULT database
COMPUTE	Compute entries in a database
LIST	Display database records in sequential order
PRINT	Print database records in sequential order
PRINTER	Printer output control and redirection
SELECT	Select database records meeting specified conditions, creating a RESULT database
SORT	Sort database records by entries
STAX	View or print statistics of entries
TABULATE	Summarize specified entries. Print or save the result
TITLE	Print report headings

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DIR	View the list of files in the disk directory
LOGDISK	Log a new disk in the computer
RENAME	Change the name of a database or file
SAVE	Save a RESULT database
SET	Set operating parameters
SYSTEM	Exit from Condor 1 back to operating system
TERM	Defines the computer (not needed on Amstrad)

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ABC REVIEW

Plain planning in Plannercalc prose

If you have an ordered mind and would rather plan your expenses than fiddle with a spreadsheet then Plannercalc is for you. Ken Clark takes a look.

Plannercalc is one of the numerous programs labelled as spreadsheets now available for the PCW8256.

However, Plannercalc is substantially different in format from your run-of-the-mill spreadsheet and would perhaps be better classed as a financial planning program.

It takes the appearance of a product like Plannercalc to make you realise you have probably been misusing spreadsheets all along, forming models by organic growth rather than by sitting down and planning in advance the parameters and results required.

Plannercalc is designed for those in business who need computers to make their lives easier, rather than for number-crunching computniks. The product succeeds here because all commands are given in plain English instead of the esoteric key sequences and formulae a standard spreadsheet demands.

The PCW8256 version comes on a self-initialising disc containing lots of useful text screens before the program is entered, describing the implementation of Plannercalc on the machine. When you become more familiar with the program it is possible to by-pass this information and dive straight into the product.

When you first enter the program you are presented with the opening screen, and a single keypress takes you into the main screen format which makes full use of the PCW's large screen. A sample model is provided (see Figure 1) that provides an excellent example of the program's operation.

Help screens are available for all the features and these are invaluable for familiarising yourself with the program. There are several different modes that reflect the various operations possible. Command mode is the general purpose mode used for initial data entry and general housekeeping (disc directories and so on). Display mode allows you to view the cell contents, and if necessary to amend them. Print mode allows you to generate a hard copy of either a set of results or analysis of the spreadsheet contents.

An advantage of the program's simplicity is that is uses less memory than most of its rivals and therefore supports a larger spreadsheet. Typically, a spreadsheet could contain up to 3,000 cells as opposed to somewhere between 1,000 and 2,000 in Supercalc or The Cracker.

Figure 1 shows an analysis of the sample model. The first thing to notice here is how comprehensible the analysis is – data is entered in a similar format from Command mode.

Up to 10 headings are allowed and they will be printed on all reports. Each line and column of the worksheet has a number and label associated with it to the left of the equals sign, and any assignations to the right.

The use of text labels really aids understanding. For example:

Line 8.0 GROSS = REVENUE – SUM OF RAW'MATER THRU DISTRIB

assigns to line 8.0 the label GROSS. This is then allocated the value of the row labelled REVENUE which is subtracted from the sum of all the rows between the one labelled RAW'MATER and the one labelled DISTRIB inclusive for every column. Much better than the obtuse formula SUM(B4:B7) that you would find in some other spreadsheets.

Unless specifically requested a formula is assumed to refer to the whole line. So for periodic work – monthly takings analysis for example – life is made so much easier.

This also is true for constants. A line such as:

Line 21.3 REPAYMNT = 123.45

would put the fixed repayment figure of

123.45 in every column.

Most of the lines in the example are self explanatory. The GROW.. ..BY function takes an initial seed value and increases it in each successive period by the indicated amount.

For example:

Line 2.0 SELL'PRICE = GROW 350. BY 11.%

would place the seed value 350 in the first column and increase it by 11 per cent in each successive column. Neat eh?

Split screen operation is supported either vertically or horizontally, so that two sections of the model can be viewed simultaneously.

The actual commands available are restricted compared with most spreadsheets, with only basic mathematical operations supported.

However there is sufficient power to support cash flows and standard financial summaries which is what it is intended for. Formatting for display allows each column width to be specified separately, but the number of decimal places can only be set for the whole sheet. All text entries are left justified and all numeric entries are right justified.

There are limitations in the way the cell referencing works when compared with a standard matrix format. For example, individual cells cannot be copied – only entire lines or columns – and there is no facility for moving a section of the spreadsheet.

Save operations can only be performed on an entire model, and it is not possible to merge one model into another.

The manual provided is generic (that is, not Amstrad specific). It is well laid out and written at the right level for the first time spreadsheet user. There are plenty of examples, together with a quick reference section for commands and error messages.

Conclusions

Plannercalc does not pretend to be the world's most powerful spreadsheet. Instead it claims to be one of the easiest to use for the non-computer literate and in this it succeeds.

If you are looking at a package that will answer all your mathematical queries while calculating pi to 40 decimal places then Plannercalc is not for you.

If, however, you want something to assess your company's cash flow or your home finances then this is by far the simplest program to use.

Plannercalc has a big brother called Masterplanner, which fills in many of the gaps left and which also has an identical file structure. So if you decide at a later date that you require more power, then you can easily upgrade.

All in all an excellent package well worth £39 provided you appreciate its limitations before you start.

```
Line 3.0 REVENUE = UNITS'SOLD *
SELL'PRICE

Skip 1 after Line 3.0
Line 4.0 RAW'MATER = UNITS'SOLD * 0.2
Line 5.0 LABOUR = UNITS'SOLD * 0.2
Line 6.0 PACKAGING = UNITS SOLD * 0.11
Line 7.0 DISTRB = UNITS SOLD * 0.16


Line 8.0 GROSS = REVENUE - SUM OF
RAW'MATER THROUGH DISTRIBUTOR
Line 9.0 SG&A = GROW 40000. BY 8.5%


Line 10.0 EBIT = GROSS - SG&A
Line 11.0 TAXES = EBIT * 0.44


Line 12.0  NET'INCOME = EBIT - TAXES
Column 1 QTR'1 =
Column 2 QTR'2 =
Column 3 QTR'3 =
Column 4 QTR'4 =
Column 5 SUBTOTAL'1 = QTR'1 + QTR'2
Column 6 SUBTOTAL'2 = QTR'3 + QTR'4
Column 7 YEAR = SUBTOTAL'1 + SUBTOTAL'2
Size = 7
Space = 2
Decimals = 0
Width = 12
```

Figure 1

Sections reprinted with kind permission of Punch

Punch WEEKLY 65p
March 28, 1984

"...What you all need is BrainStorm, a remarkably intelligent notion from Caxton Software...The principle behind the program is so obvious that one wonders why it hasn't been thought of before. It is this: when you start thinking about something which is eventually going to be structured and ordered, you initially think in random jumps. Unconnected ideas flash into the brain...

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BrainStorm answers all these questions with great simplicity. Essentially it is a *list organiser.* You start with a more-or-less blank screen. You can either plan your main headings now, or start entering jottings at random. Most people go for a half-way house; perhaps you can put down "Beginning, Middle, End", as your three headings. Then start putting down your ideas. Pretty soon BrainStorm will follow your thoughts and start making interconnections on the basis of word-matches...

Using it while writing this review has been a salutary experience. Couldn't manage being without it now, whether for organising production schedules for these pages, planning our longer articles elsewhere in the magazine, or writing speeches...

Hitch-hiker wizard *Douglas Adams* is said to be delighted with his...

Takes about 30 minutes to learn to use it..."

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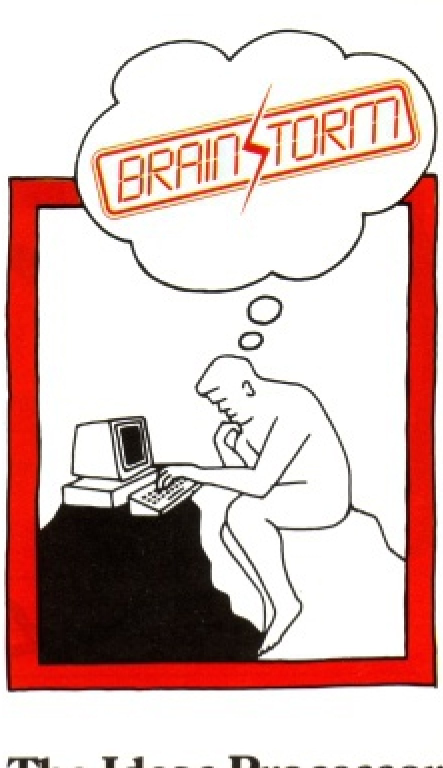
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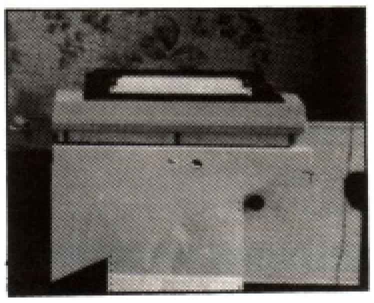
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ABC
PROGRAMMING

Working in the right GSX environment

Ken Clark stirred the muddy waters of GSX last time and started to explain how its capabilities could be exploited by humble CP/M addicts – well now he's back, so pay attention.

The most important thing in GSX is to know the environment you are working in. Each device driver has its own unique environment, every aspect of which can be interrogated by your program.

Every time a workstation is opened 10 parameters are passed which set up the default line types, colours and so on.

After the device has been opened, the arrays INTOUT and PTSOUT contain details about the device driver – there are 45 entries in the INTOUT array and 12 in the PTSOUT array. Figure 1 contains details of all the parameters passed and received when opening a workstation.

Obviously you need to grab the items of information as soon as the workstation is opened because the contents of the arrays may become corrupt after subsequent commands have been executed.

Some of the output parameters might appear, at first glance, to duplicate each other so care must be taken to interrogate the correct item.

For example: INTOUT 14, 36 and 40 might seem to do much the same job, whereas they are all distinct.

INTOUT(14) is the number of colours that can be displayed simultaneously on a device. A standard printer will have two colours – black and white – while Mode 1 on a 6128 can display four colours at once.

INTOUT(36) signifies whether the device can support colour at all. The Joyce screen driver, for example, is purely monochrome and so does not support colour. But Mode 2 on the 6128, although allowing only two colours, may use colours other than black and white and so the device does support colour.

INTOUT(40) just shows the total number of colours available, for example 27 with the 6128 screen drivers and two with Joyce's.

The only way to really determine which parameters you need to use is to do the same as I did – have a bash and see what happens!

Fun-fun-functions

Figure 2 is a list of the GSX functions available. Not all of these are supported by the device drivers supplied with Amstrad computers.

Some are marked in the key as only being partially supported, which is mainly because fill patterns are not supported by the screen drivers which default to merely outlining the area.

These functions are fully supported on the printer drivers so that your masterpiece will look even better on the printer than it does on the screen. When using the printer drivers there are four types of interior fill styles:

0 Hollow (outline with no fill).
1 Solid.
2 Halftone pattern (dot patterns).
3 Hatch patterns.

There are six fill style indexes (1-6). The fill style index only produces a visible effect when the interior fill style is set to 2 or 3. The halftone patterns give grey scale shading with 1 being the lightest and 6 the darkest.

Luckily many of the GSX functions have similar structures. The three structures in Figure 3 are the most used. All the other functions have unique structures which will have to be squeezed in next month.

Basically bars

This month's Basic listing in Figure 4 is a simple bar chart program called BARCHART.BAS.

I would not actually claim it to be 3D but it does give the illusion of depth.

The program will require the Basic to be set up in exactly the same way as last month's program and you will need the GSXPREP program supplied last month.

The program is not very long, though perhaps longer than you would expect for what it does, but bear with me as it relates to what I was saying earlier about knowing the environment.

By using information gleaned from the device driver it is possible to construct a program which makes the best possible use of the facilities available, rather than rounding everything down to the lowest common denominator.

On a Joyce screen the program

displays the bar chart in glorious monochrome. On the CPC6128 with the Mode 1 driver the skeletal columns, grid and labels are all in different colours and when using the printer drivers it is displayed in all its glory with rotated and enlarged characters, each column with a different fill pattern and shading effects.

The program uses the same Mallard/GSX interfacing techniques as described last month – in fact the lines from 50,000 onwards can be filched directly from the BOXEDIN program and so save your delicate fingers.

The program starts by initialising the month name array and then prompts for the GSX Driver number. This refers to the assignment number you defined in the ASSIGN.SYS file. For instance if your ASSIGN.SYS file looks like this:

```
21 a:DDFXHR
22 a:DDFXLR8
01 a:DDSCREEN
```

entering 21 at this point will send the graph to the printer using the highest resolution driver. Entering 1 will direct output to the screen.

The GSX interface is now initialised and the required device opened, so at this point I grab a couple of returned values from the device (the colour capability flag, and the number of colours available).

If colour is possible (6128 Mode 1) the colours are redefined to less insipid shades. The title is centred (enlarged if on the printer), the grid drawn and the bars plotted.

If the target device is the screen a message to press Return is centred and

Input:

contrl (1)	Opcode = 1.
contrl (2)	0.
contrl (4)	Length of intin = 10.
intin (1)	Workstation (device driver) indentifier. Used to determine which device driver to load into memory.
intin (2)	Linetype.
intin (3)	Polyline colour index.
intin (4)	Marker type.
intin (5)	Polymarker colour index.
intin (6)	Text font.
intin (7)	Text colour index.
intin (8)	Fill interior style.
intin (9)	Fill style index.
intin (10)	Fill colour index.

Output:

contrl (3)	Number of output vertices = 6.
contrl (5)	Length of intout = 45.
intout (1)	Maximum addressable width of device 1 in pixels.
intout (2)	Maximum addressable height of device 1 in pixels.
intout (3)	Device coordinate units flag.
	0 = Device producing precise scaled image (usually plotters or printers).
	1 = Device not capable of precisely scaled image (CRTs).
intout (4)	Width of one pixel in micrometres.
intout (5)	Height of one pixel in micrometres.
intout (6)	Number of character heights.
intout (7)	Number of linetypes.
intout (8)	Number of line widths.
intout (9)	Number of marker types.
intout (10)	Number of marker sizes.
intout (11)	Number of fonts.
intout (12)	Number of patterns.
intout (13)	Number of hatch styles.
intout (14)	Number of predefined colours (must be at least two even for monochrome device). This is the number of colours that can be displayed on the device simultaneously.
intout (15)	Number of Generalised Drawing Primitives (GDPs).
intout (16)	
intout (25)	Linear list of GDP numbers supported. –1 = no more GDPs in list.
	1 – bar.
	2 – arc.
	3 – pie slice.
	4 – circle.
	5 – ruling chars.
intout (26)	
intout (35)	Linear list of attribute set associated with each GDP.
	–1 – no more GDPs.
	0 – polyline.
	1 – polymarker.
	2 – text.
	3 – fill area.
	4 – none.
intout (36)	Colour capability flag.
	0 – no.
	1 – yes.
intout (37)	Text rotation capability flag.
	0 – no.
	1 – yes.
intout (38)	Fill area capability flag.
	0 – no.
	1 – yes.
intout (39)	Read cell array operation capability flag. (Always 0 with Amstrad device drivers).
	0 – no.
	1 – yes.
intout (40)	Number of available colours (total number of colours in palette).
	2 – monochrome.
	▷2 – number of colours available.
intout (41)	Number of locator devices available.
intout (42)	Number of valuator devices available.
intout (43)	Number of choice devices available.
intout (44)	Number of string devices available.
intout (45)	Workstation type.
	0 – Output only.
	1 – Input only.
	2 – Input/Output.
ptsout (1)	0.
ptsout (2)	Minimum character height in device units (not cell size).
ptsout (3)	0.
ptsout (4)	Maximum character height in device units (not cell size).
ptsout (5)	Minimum line width in device units.
ptsout (6)	0.
ptsout (7)	Maximum line width in device units.
ptsout (8)	0.
ptsout (9)	0.
ptsout (10)	Minimum marker height in device units (not cell size).
ptsout (11)	0.
ptsout (12)	Maximum marker height in device units (not cell size).

Figure 1: Open workstation

the program waits for the keypress before terminating itself. This description may seem terribly brief but it is not the object of this article to teach Basic programming skills! There are, however, a few things to note:

The commands to increase the character height, change the fill patterns, rotate the fonts and so on are simply ignored by device drivers that cannot handle these functions without any nasty side effects.

The subroutines in lines 4900 to 5050 show how easy it is to utilise the single parameter GSX opcodes. Subroutine 2000-2125 may look overly complicated but when plotting lines, markers or boxes an x and y coordinate is required for every point that is to be plotted, and so this is something you will have to live with.

Also remember that the program has been set up so that the maximum number of points that can be drawn with one polyline command is 64. If you need to increase this alter the DIM statement in line 60040 so that the ptsin array is set to double the number of points to plot.

● *Right, we seem to have run out of room this month. Next time I will give the rest of the parameter passing structures and a short example using GSX with machine code. Then you will be on your own, because by that point you will know as much as me!*

Opcode	Function	Key
1	Open workstation	
2	Close workstation	
3	Clear workstation	
4	Update workstation	
5	Escape (perform device specification operations, see next month).	
6	Output a polyline	
7	Output a polymarker	
8	Write text	*z*
9	Fill a polygon	
10	Define cell array	
11	Graphic drawing primitive (GDP) 1 bar fill	
12	Set character height	
13	Set text direction	
14	Set colour representation	
15	Set polyline line type	
16	Set polyline line width	
17	Set polyline colour index	
18	Set polymarker type	
19	Set polymarker scale	
20	Set polymarker colour index	
21	Set the hardware text font	
22	Set text colour index	*b*
23	Set interior fill style	*bp*
24	Set fill style index	*bp*
25	Set fill colour index	*b*
26	Inquire colour representation	*z*
27	Return cell array definition	*x*
28	Return locator position	*x*
29	Input valuator	*x*
30	Input choice	*x*
31	Input string	*x*
32	Set writing mode	*x*
33	Set input mode	*x*

Key:

x *Not implemented in Amstrad supplied device drivers.*
p *Only fully implemented in printer device drivers. Ignored or forced to minimum specification in screen drivers.*
i *Not required, so ignored.*
a *Common parameter specifications as described in text.*
b *Common parameter specifications as described in text.*
c *Common parameter specifications as described in text.*
z *Uses unique parameter specification, see text.*

Figure 2: GSX opcodes

TYPE A: No parameter commands.
Input: CONTRL(1) = opcode.
CONTRL(2) = 0.
Output: CONTRL(3) = 0.

TYPE B: Single parameter commands.
Input: CONTRL(1) = opcode.
CONTRL(2) = 0.
INTIN(1) = requested parameter.
Output: CONTRL(3) = 0.
INTOUT(1) = selected parameter.

The selected parameter will be different from the requested if the latter is outside the legal range that the particular function or device driver is capable of.

For example if you ask for the text colour to be colour number 3, when you only have a two-colour device GSX will select the maximum possible (that is, 2).

TYPE C: Coordinate parameter commands.
Input: CONTRL(1) = opcode.
CONTRL(2) = Number of vertices (x, y pairs) to be plotted.
ptsin. Array of coordinates in NDCs.
PTSIN(1) = x coordinate of 1st point.
PTSIN(2) = y coordinate of 1st point.
PTSIN(3) = x coordinate of 2nd point.
PTSIN(4) = y coordinate of 2nd point.
PTSIN(2n–1) = x coordinate of last point.
PTSIN(2n) = y coordinate of last point.
Output: CONTRL(3) = 0.

Note that the number of vertices in CONTRL(2) is actually half the number of elements in the array, that is it is the number of pairs in the ptsin array.

Figure 3

```
10 'GSX-MALLARD interface courtesy Locom
   otive Software
20 '
30 DEFINT a-z:DIM month$(12)
40 DEF FNl(x)=-(2-maxcol+2)*(device<11)-
   x*(device>10)
50 FOR a=1 TO 12:READ month$(a):NEXT
60 DATA January,February,March,April,May
70 DATA June,July,August,September
80 DATA October,November,December
90 '
100 INPUT "GSX driver number ",device
110 array=12:pest=24576/array:w=pest/2
120 mx=500:my=500
130 GOSUB 60000:GOSUB 60100 'Initialise
    and open workstation
140 colour=intout(36)
150 maxcol=intout(14)-1
160 GOSUB 1000 'define colours
170 height=800:GOSUB 4900:cwidth=ptsout(
    3)
180 lly=31700:mesg$="Bloggs & Co - Sales
     Performance":GOSUB 1400
190 GOSUB 1200 'draw grid
200 GOSUB 1100 'draw column
210 GOSUB 1300 'end screen
220 tcolour=1: GOSUB 4990 'restore colou
    rs
230 GOSUB 60200 'Close workstation
240 END
1000 'define colours
1010 IF NOT colour THEN RETURN
1020 RESTORE 1070: FOR a=0 TO maxcol
1030   READ intin(1),intin(2),intin(3),i
     ntin(4)
1040   GOSUB 4960
1050 NEXT a
1060 RETURN
1070 DATA 0,0,0,1,1,501,501,501,2,501,50
     1,0,3,1,501,1
1100 'draw column
1110 x=8000: y=8000-my:
1120 degree=90: GOSUB 4940
1130 height=800:GOSUB 4900
1140 FOR a=1 TO array
1150   h=20000*RND: GOSUB 2000
1160   llx=x-((device>10)*cwidth)
1170   lly=8000-9*cwidth: mesg$=LEFT$(mo
     nth$(a),FNl(LEN(month$(a))))
1180   GOSUB 50100: x=x+pest
1190 NEXT a: RETURN
1200 'draw grid
1210 llx=8000: lly=8000: trx=32000: try=
     30000: GOSUB 50000
1220 tcolour=3: GOSUB 4990
1230 height=600:GOSUB 4900
1240 FOR ll=0 TO 22000 STEP 5500
```

```
1250  ptsin(1)=8000: ptsin(2)=8000+ll
1260  ptsin(3)=32000: ptsin(4)=8000+ll
1270  contrl(1)=6:contrl(2)=2:GOSUB 610
      30
1280 llx=2000: lly=ll+8000:mesg$=RIGHT$(
     "      "+STR$(ll),6): GOSUB 50100
1290 NEXT ll: RETURN
1300 'end screen
1310 IF device>10 THEN RETURN
1320 degree=0: GOSUB 4940:lly=500
1330 mesg$="Please press [RETURN]":GOSUB
     1400
1340 WHILE INKEY$<>CHR$(13): WEND
1350 RETURN
1400 'centre message
1410 tcolour=2:GOSUB 4990
1420 llx=(32767-cwidth*LEN(mesg$))/2:GOS
     UB 50100
1430 RETURN
2000 'draw column
2010 GOSUB 3000: colour=2: GOSUB 5040
2020 llx=x: lly=y: trx=x+w: try=y+h: GOS
     UB 50000
2030 '
2100 fill=1:GOSUB 5000
2110 ptsin(1)=x+w :ptsin(2)=y+h: ptsin(3
     )=x: ptsin(4)=y+h
2111 ptsin(5)=x+mx: ptsin(6)=y+h+my: pts
     in(7)=x+mx+w:ptsin(8)=y+h+my
2112 ptsin(9)=x+w: ptsin(10)=y+h: ptsin(
     11)=x+w: ptsin(12)=y
2113 ptsin(13)=x+w+mx: ptsin(14)=y+my: p
     tsin(15)=x+w+mx: ptsin(16)=y+h+my
2120 contrl(1)=9:contrl(2)=8:contrl(4)=0
     :GOSUB 61000
2125 RETURN
3000 ' setup colours, fill patterns etc
3010 fill=(a-1)\6+2:GOSUB 5000
3020 pattern=(a-1) MOD 6+1:GOSUB 5020:RE
     TURN
4900 'set text height
4910 contrl(1)=12:contrl(2)=1:ptsin(1)=0
     :ptsin(2)=height: GOSUB 61000:RETUR
     N
4940 'Set text direction
4950 contrl(1)=13: intin(1)=degree*10: G
     OSUB 61100:RETURN
4960 'specify colour index
4970 contrl(1)=14: contrl(2)=0: GOSUB 61
     000: RETURN
4990 'set text colour
4995 contrl(1)=22:intin(1)=tcolour:GOSUB
      61100:RETURN
5000 'set interior fill style
5010 contrl(1)=23:intin(1)=fill:GOSUB 61
     100:RETURN
5020 'set fill pattern
5030 contrl(1)=24:intin(1)=pattern:GOSUB
      61100:RETURN
5040 'set fill colour
5050 contrl(1)=25:intin(1)=colour:GOSUB
     61100:RETURN
50000 'draw a box
50010 '
50020 contrl(1)=11: contrl(2)=2: contrl(
      6)=1
50030 ptsin(1)=llx: ptsin(2)=lly
50040 ptsin(3)=trx: ptsin(4)=try
50050 GOSUB 61030: RETURN
50100 'print text
50110 '
50120 contrl(1)=8: contrl(2)=1: contrl(4
      )=LEN(mesg$)
50130 ptsin(1)=llx: ptsin(2)=lly
50140 FOR b=1 TO LEN(mesg$)
50150   intin(b)=ASC(MID$(mesg$,b,1))
50160 NEXT b
50170 GOSUB 61030
50180 RETURN
60000 ' Define arrays and address of "ju
      mp" to GSX
60020 '
60030 gsx=&H30
60040 DIM contrl(6),ptsin(128),ptsout(12
      ),intin(128),intout(45)
60050 RETURN
60100 ' open workstation
60120 '
60130 RESTORE 60160:contrl(1)=1:contrl(2
      )=0:contrl(4)=10
60140 FOR i=1 TO 10:READ intin(i):NEXT:i
      ntin(1)=device
60150 GOTO 61000
60160 DATA 1,1,1,1,1,1,1,0,0,1
60200 'close workstation
60220 '
60230 contrl(1)=2:contrl(2)=0:contrl(4)=
      0:GOTO 61000
61000 'Actual call of GSX
61020 '
61030 CALL gsx(gsx,gsx,contrl(1),intin(1
      ),ptsin(1),intout(1),ptsout(1))
61040 RETURN
61100 'Call of GSX with one intin par on
      ly
61120 '
61130 contrl(2)=0: contrl(4)=1: GOTO 610
      00
```

Figure 4

ABC BOOKS

This month's batch of books includes the first 8256 book to pass the post – no doubt there are others hard on its heels. The CP/M Plus guide is the first book to cater for the Amstrad user so you won't have to suffer the vague generalisations found in so many other CP/M books.

The Amstrad CP/M Plus

Those owners of CPC6128s and PCW8256s who have been waiting for something rather more heavyweight than the initial crop of beginners books need wait no more.

Andrew Clarke and David Powys-Lybbe have conspired to lighten our darkness with a massive tome that starts exploring the subject with the conception of CP/M back in the dark old days of 1974, and traces it through to the implementation of Amstrad's CP/M Plus by Locomotive Software.

The co-authors' interest in CP/M extends beyond the purely functional, and so the book meanders through just about every aspect of the subject.

A detailed dissection of the delights of ED and PIP (and every other utility available to CP/M Plus users) is liberally laced with an overview of public domain software and a brief foray into the realms of classic applications, by way of preparing the unwary reader for what lies in wait at chapter 7.

Redoubtable is hardly the word for the exposition in chapter 7 on the BDOS and BIOS. Extent folding, RSXs, FCB, SCBs are all covered in detail. A detailed analysis of each BDOS function is provided, with more than enough information to enable the competent machine code programmer to get to grips with CP/M.

The GSX chapter is somewhat brief – tersely referring the programmer to the Digital Research GSX manual for further succour. Programming languages are explored at length, and even Algol-M is exhumed and considered. I was particularly intrigued by the WRITEON statement.

This book is a rare thing indeed. It manages to explore and explain a very dry technical matter with a degree of humanity that is lacking in most comparable works. The de facto references in this sphere are the works of one Mitchell Waite who, with a crew of collaborators, made writing CP/M books a one-man industry in the CP/M heyday around 1980.

The Amstrad CP/M Plus is a far better book than any of the non-specific CP/M books available. The index is quite exemplary, and was apparently produced using one of the built-in functions of NewWord3.

The first edition uses a convenient and sturdy loose leaf ringbinder. The print is just a fraction too small to be entirely comfortably read, and even then the 470 pages only just fit!

The book is an essential companion to all Amstrad CP/M users who believe in life after Locoscript. Buy it.

The Amstrad CP/M Plus
A.R.M. Clarke and David Powys-Lybbe.
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Mastering the Amstrad PCW8256/8512

It took longer than many of us thought, but John Hughes has produced the first of the PCW8256 books, and thus heads the list of those authors eternally grateful to the shortcomings of the original manuals.

John Hughes approaches the subject from scratch and it is soon obvious that the 8512 on the cover was a piece of last minute opportunism that failed to influence the content.

Full marks for speed – and what a good job that the PCW8512 is really only a fattened PCW8256 with nothing likely to affect the relevance of a book based squarely on its predecessor.

The book launches into Locoscript using the same screen dump techniques that adorn the original manual.

The latest version of Locoscript I could find mentioned was 1.04 (in the context of describing the infamous page numbering bug), and there appears to be nothing too "version sensitive" about this treatise to confuse the reader, although some of the Locoscript 1.2 features have consequently been overlooked.

Some of the typography used to differentiate between text typed at the keyboard and the general narrative gets a little woolly here and there.

The SET24X80 instructions got garbled on page 130. It does no harm for the beginner to be introduced to the user-friendliness of CP/M in such an innocuous way.

The book begins to sparkle when it comes to the brief overviews of CP/M applications software. The author lets his hair down and drops the rather coy style adopted for the complete beginner, and consequently the CP/M applications sections flow well. Supercalc2, Cambase, Camsoft Payroll, Flexifile, Cracker, NewWord and Sage are explored and presented in a factual manner to enlighten the owner.

The style of the book should suit the novice very well. Most of you reading *ACU* may well be beyond this simplistic style, but you may find that a dose of John Hughes will keep your newly computerised friends and relations off your back – for a while!

Mastering the Amstrad PCW 8256/8512
John Hughes
ISBN1-85058-052-9
Sigma Press
£8.95

ABC PROFILE

Prevention is better than a cure

The secret of implementing a database on a computer is to know what you want. Sounds obvious, but the computer world is still full of woolly definitions and badly matched software. Jeremy Spencer examines the case of a doctor who wants a database but this punter knows what he's really after.

General practitioners have more cause than most to welcome the appearance of cheap but powerful computer systems.

Not only are they at the sharp end of National Health bureaucracy but the efficiency of a doctor's record keeping can make for early diagnosis of problems before the onset of unnecessary suffering.

Dr Edwards, a local GP, recognises that his time is better spent trying to detect illness before it develops into a serious problem. But the only effective way of accomplishing this is by screening seemingly healthy people, and ensuring that wherever possible the risk of disease is reduced by regular vaccination.

Doctors have some pretty powerful allies to try and coax a healthy, but apathetic, population into the surgeries, not least the government, which spends millions on campaigns trying to educate us to take advantage of the tests and screenings offered by the National Health.

Education is enough

Take cancer as a case in point. We all know that if it is caught in the early stages the chances of a complete cure are very high. This is particularly true in the case of cervical cancer, but the number of women who fail to take advantage of the free screening services remains distressingly high.

Where mass education fails, the individual approach may succeed. It was with this idea in mind that Dr Edwards decided that an Amstrad Joyce could help save lives.

He and his partners already maintained records on their 7,000 patients. The records contain sufficient information to enable the doctors to discover which patients are due for tests or vaccinations and invite them to attend surgery.

But the examples in Figure 1 will give you some idea of the problems involved in sorting these paper records by hand – this is the information which doctor Edwards identified as being vital and which should be produced automatically by a computerised database.

When a patient's name is listed it should be complete with full name, address, date of birth, doctor, National Health number and a list of important allergies or problems such as epilepsy.

You will appreciate that these demands are quite rigorous. The first list calls for a database to be searched on three criteria – namely that the patient should be a female, not have had a hysterectomy and not have been smear tested within three years of the date of the search.

But in truth the task isn't as difficult as it first seems – any database worth its salt could cope with ease. But at this stage it isn't the software that you should worry about – it is the definition of the task you want the software to perform.

Potential database users very easily forget that computers operate on a complex series of simple, unambiguous instructions. You cannot define a database with only a rough idea of the task to hand. Unless you know exactly what you want the database to produce you won't know what information to put in. Put too much in and you could run out of disc space – too little and you won't get the results you wanted.

Don't forget to plan ahead. What sort

1. A list of all women under the age of 45 who had not had a smear test in the last three years.
2. Same as 1, but for women over 45 who had not had a test in five years. Both lists must exclude women who have had a hysterectomy operation.
3. A list of all males over the age of 65 who have not had a blood pressure test in the last five years.
4. A list of all girls over the age of 13 who have not been vaccinated against rubella (German measles).
5. Future screening plans will require children under five years old to be listed.

Figure 1

of information will you want in the future? Does the database have the means to produce it?

Dr Edwards is fortunate in that he is an old hand in the computing world, such an old hand in fact that he almost bought a machine called a ZX80, but hesitated just long enough for it to be replaced by the superior ZX81 model.

By the time Sinclair launched the Spectrum computer he was a programming addict and so he set about convincing himself, and his family, that they had an urgent need for a Spectrum. It was on this second machine that he finally managed to marry doctoring and computing, by writing a repeat prescription program.

The task of the program was simple enough. Prescriptions given to patients would be filed away on a cunning little number called a microdrive – a cross between a very high speed cassette recorder and a pain in the neck.

When the patient had used up the first prescription a second would be printed out by the Spectrum from the information kept on file. Of course the chances of the drug still being on the recommended list by the time the file had been recovered were pretty slim, but this was of no consequence when one considers the elegance of the scheme.

Now Dr Edwards has put his Spectrum days behind him – instead he is writing the same application in Mallard Basic – but his understanding of programming means that he is able to define a computer task.

Consider the tasks listed above with the fields (a field being an item of information within a record) listed in Figure 2.

The numbers in brackets denote the number of characters required to store the information in each field. There is a certain elegance here – note that only four characters are being used for the date where the day is unimportant. That saves six characters in each record, so for 7,000 patients that's 42k of space.

Also, only 20 characters have been allocated for the address and post code which sounds a bit optimistic, until you tune into Dr Edward's logic. Being a family practitioner all his patients are based around a single town so he can dispense with the town name and county because they apply to every record.



1. Surname (12)
2. First name and initials (10)
3. Address including post code (20)
4. Date of birth (8)
5. National Health number (12)
6. Sex m/f (1)
7. Date of registration (6)
8. Doctor (1)
9. Date of last smear – month and year (4)
10. Disease codes (10)
11. Date of last blood pressure (4)
12. Date of last tetanus injection (4)
13. Rubella vaccination y/n (1)

Figure 2

Field number 11 will hold the information on hysterectomies, epilepsy and so on. Eight important ailments have been each assigned a single code – this leaves two codes spare for any future changes.

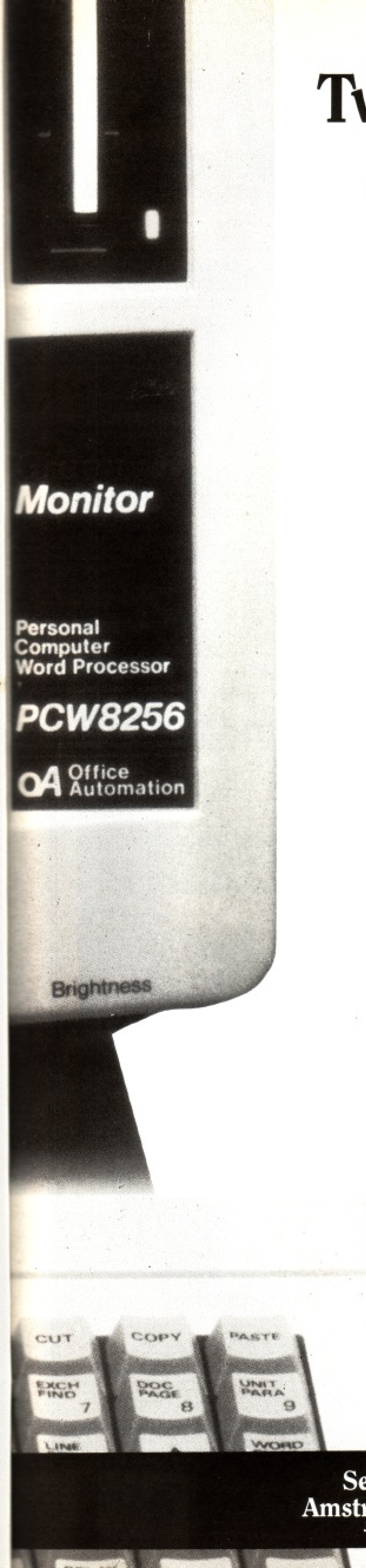
Imagine you're a computer for a moment and complete each of the tasks outlined in Figure 2. You will find that all the information you need is provided, no more and no less. For many applications you might get away with being generous with the space but the good doctor, even after his thrift, is still going to need 651k – just for the data (yes, he's getting a second drive).

Time to do the shopping

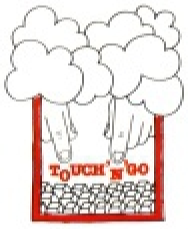
With any luck the doctor's careful design should prevent the need for any awkward cures later. Now it's time to look for the software which can do the business.

● *Next time our Amstrad nomad, Chris Laing, will examine the options and give the Doctor some tips on what he should be looking for.*

ABC



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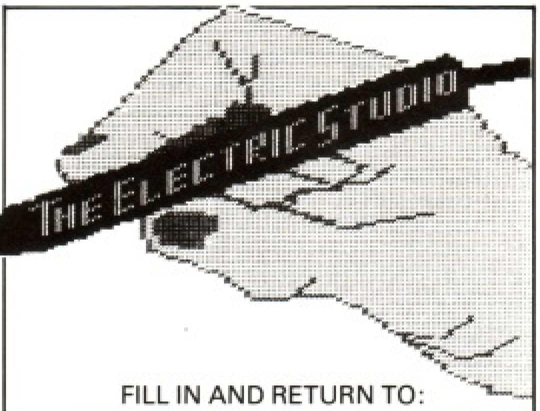
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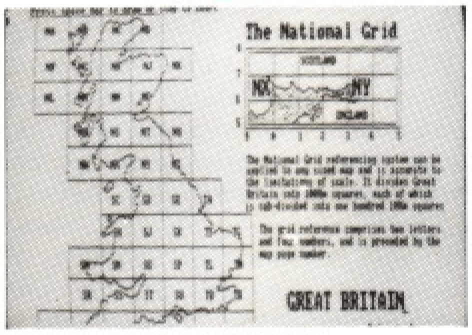
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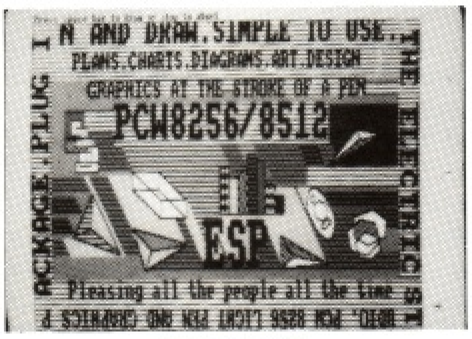
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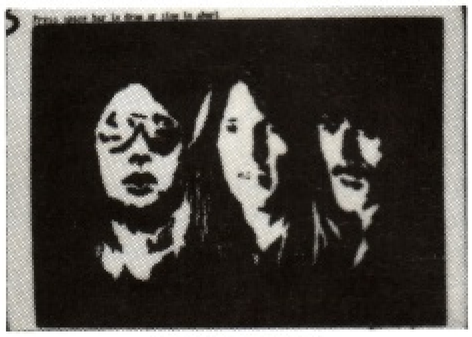
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THE ELECTRIC STUDIO

ABC SPECIAL

Advanced Locoscript for beginners

Let's take another peek through the holes in the back of our PCW 8256 and see if we can catch some more life inside Locoscript.

Eddie was sitting in his office catching up on some paperwork. Pete was with him, busy sharpening pencils. Pete's stomach rumbled loudly.

"Is it 12.30 already?" asked Eddie. "Mmm" mumbled Pete glancing at the clock. "Coming to lunch?"

Eddie shuffled his papers together and stuffed them into a drawer. He paused to scratch at a brown stain on his white coat. "Okay, I'll be careful with the brown sauce today". Pete scowled at him.

Pete and Eddie had just sat down in the canteen to eat their lunch when Pete jumped up suddenly. Wildly gesticulating he called "Hey Julie! Over here!"

Julie spotted Pete and smiled. She wandered over to his table and sat down. "Hello", she said shyly.

"Hello Julie, how's it going in your department?" Eddie asked, passing her the salt. "Fine, thank you Eddie. Apart from the usual hassles. How are you two getting on together?" "Fine", said Pete and glancing at Eddie, "apart from the usual hassles".

"So what has Eddie been teaching you this week?" Julie asked. "Oh, lots of things, like . . ." "Yes . . ." said Eddie and Julie expectantly. "Well . . ."

"He's forgotten it all, already!" Eddie sighed with disgust, thumping the table and making the teacups rattle in their saucers. "No I haven't", said Pete defensively. "I know all about Locoscript. Upside down, back to front . . ."

"But do you know it sideways?" interrupted Eddie. "No, but I think I'm about to find out" thought Pete to himself.

"One of the most important things to remember about Locoscript is that the text we display on the screen is positioned according to the size it will ultimately be printed in". Eddie paused for breath. Julie's eyes glazed over.

"That means that Locoscript takes the width of the character into account when it is deciding how many characters can fit on one 1 line.

"Across the top of the screen there are dots showing the number of characters that can fit between the margins. This is the number of characters in the base layout pitch. Now you're going to say 'what's a base layout pitch, Eddie?' "

"What's a base layout pitch, Eddie?"

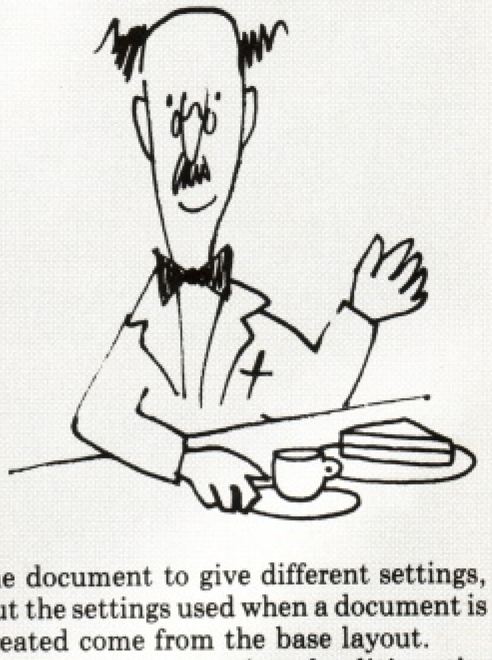
"Well, you know that a base layout contains all the default information about a document – like the margin widths, the line pitch and spacing, whether the document is in italics or right justified.

"It also has a character pitch, the width that a character is printed on the printer, and it is this that is called the base layout pitch. Usually this is 12 pitch and using the default A4 template there are 72 characters across the paper".

Pete butted in "Ah, but Hammer-fingers has found out that he can change the base layout pitch by pressing F7 Enter, F7 F1".

"Shh!" said Eddie glancing left and right. "You never know who's listening. And you shouldn't call our User Hammer-fingers.

"Further layouts can be included in



the document to give different settings, but the settings used when a document is created come from the base layout.

"Since you mentioned editing the you-know-what, I'll tell you about altering the margins. It's even possible to alter the margins to allow lines of text to be printed that are actually longer than the printer is wide".

"What happens to the rest of the line when the printer has printed as far to the right as it can go?"

"The guys that run the printer don't really know what to do with the extra characters so they have to throw them away. This is something that can cause a deal of confusion to people like Ham . . .

like our User. Something else that can be confusing is the way in which Locoscript represents different sizes of text on the screen.

"Obviously the screen can only show one size of character, but there are several different sizes that the printer can produce. This means that text shown on the screen that isn't in the base pitch, but some other pitch that has been set by the user, won't be in exactly the right position.

"Now the rules are, if justification is off, and the current text size is greater than the base pitch – for example, base pitch is 12 and current pitch is 10 . . ."

"That's less than the base pitch", Pete complained.

"No, the smaller the number the larger the character – pitch means characters per inch. So 10 characters per inch are larger than 12 characters per inch. I thought I'd told you all this?

"If current size is greater than base size, (because current pitch has a smaller number than base pitch), the line displayed on the screen will be shorter, because there are wider characters in it. That means that the line finishes before the right hand margin.

"If, on the other hand, the number of the current pitch is greater than the base pitch's number, meaning that smaller characters are being used, it's possible to fit more characters into the line and it appears artificially long. A line may have too many characters to fit between the margins on screen and it will push out over the right.

"It is very nearly the same for justified text, which as you know is text that is spaced out to make the right margin line up. Text that would be printed larger than the base layout text has fewer letters on screen, and so to achieve the justified effect on screen Locoscript inserts more spaces between the words in the line, creating large gaps.

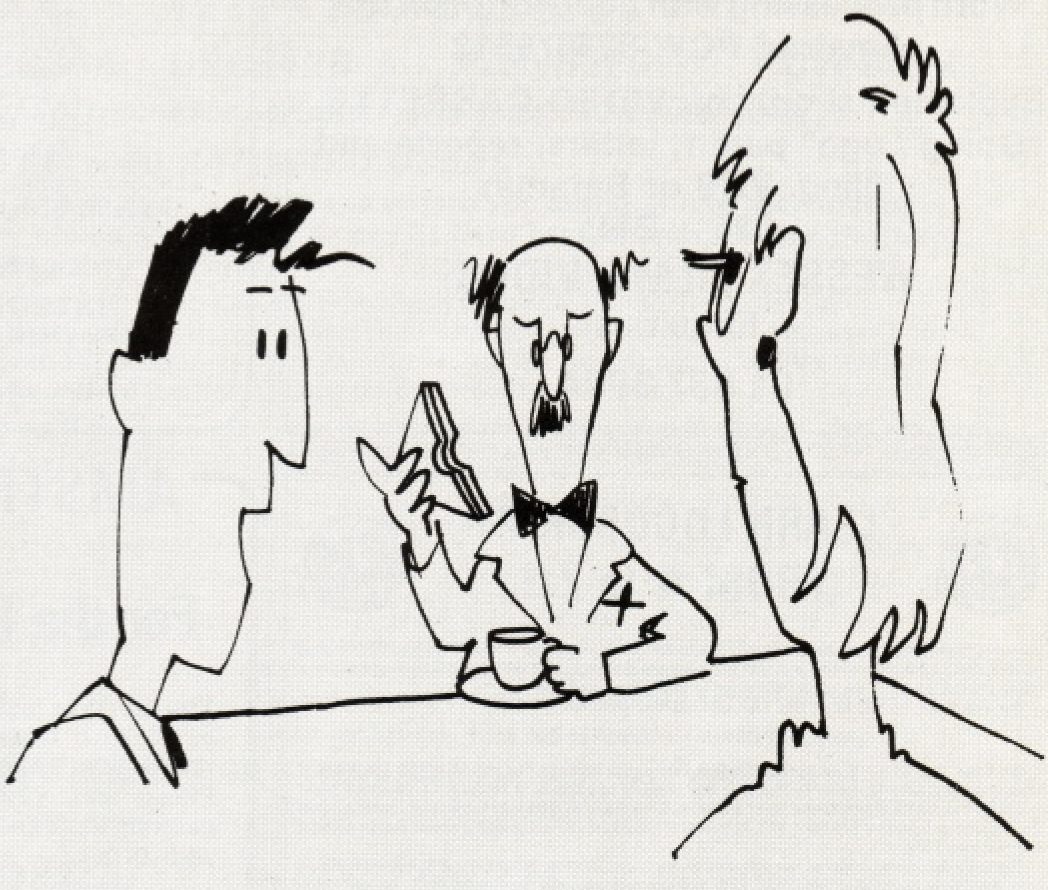
"When the text is printed out, the gaps are actually much smaller than they appear on screen. For text that will be printed using smaller characters than the base layout characters, the line will again be much longer, sticking out into the margin as it does when unjustified.

"It doesn't matter if there are mixtures of different pitches in a line, Locoscript will always do its sums right and finish the line in the right place.

"And something else that should be remembered is that proportional spaced text, PS, is a pitch size of its very own. The width of each PS character is taken into account as the line length is calculated and according to the type of characters used, the line is broken in different places".

"And you can get fewer letter Ms in a line, than letter Is. I remember that bit".

"Okay, so let's talk tabs. Tabs. Tabs, tabs, tabs, tabs, tabs", said Eddie collecting his thoughts.



"You've just gone off the end of your sentence", Pete quipped. "All this business of displaying different character sizes on screen, using only one real character size, makes displaying tabs complicated as well".

"Are tab settings changed by editing the base layout?" asked Pete suddenly.

"Shhh! Not so loud. Yes, you can change the tab settings by editing the base layout, but you can also use another layout and edit the tab settings within that.

"Goodbye boys", said Julie. They ignored her.

"Have I ever told you about indent tabs? To put these in, the User must press Alt and Tab. A funny little arrow nailed to a plank is put into the text. This works in the same way as an ordinary tab in the first line. Each following line begins at this tab position until a carriage return indicates the end of the paragraph.

"When Locoscript is being used to simply write letters, only one layout is really needed, but a complex document may need more than one.

"To put a new layout into the document the User presses F2. This puts up a menu with two parts, insert a layout and edit a layout.

"Insert allows either a brand new layout, an existing layout or the base layout to be put into the text. If a brand new layout is chosen, it can be edited before the layout is inserted in the text. The layout code and then a carriage return is put into the text. If rulers are showing, a ruler is put into the text.

"Putting in a new layout wipes out any emphasis or style set up. So to cancel any codes that are set, put in a layout code. The layout editing options mean that layouts can be edited at any point.

"This part of the F2 menu changes according to whether the current layout is the base layout or not. If it's not then there is also the option to edit the current layout".

"What were you saying about editing layouts that have been used previously in the document?" said Pete.

"You mean, for instance, if layout three is used twice in a document, and then that layout is edited, when the editing is finished the alterations made to layout three will be reflected in all the text affected by it".

"So after editing a layout the whole document is checked through in case there are changes to be made. But ask Julie about that, it's her job to check through" Pete and Eddie turned to where Julie was sitting.

"Where is Julie?" asked Pete.



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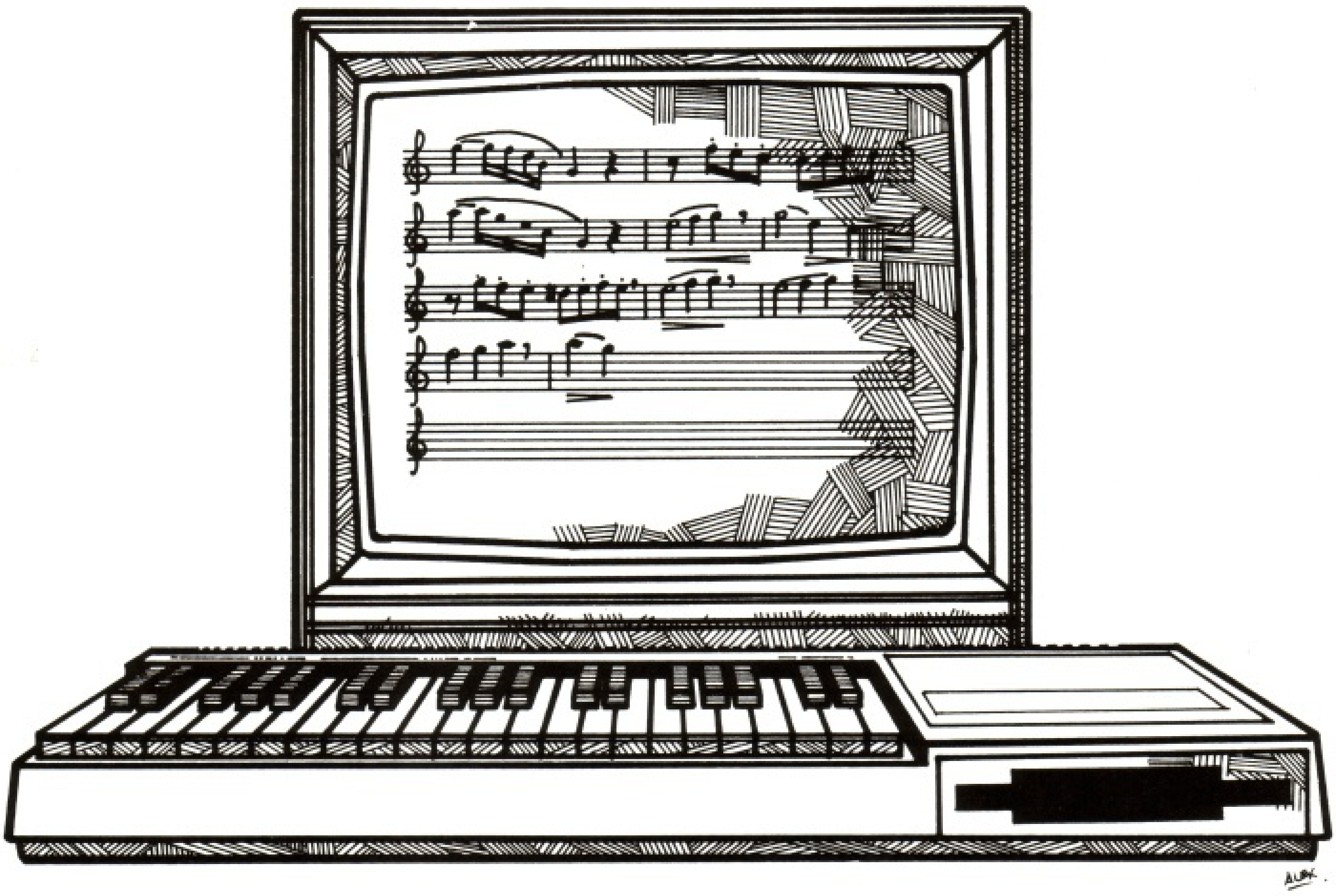
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Programmed for sound

By IOLO DAVIDSON

The Amstrad 464, 664 and 6128 have a versatile sound chip and a flexible and powerful system of commands for driving it. It is, however, a truism in computing that the more facilities there are, the more work you have to do to use them. The more variations that are possible, the more parameters you must supply.

Programming music is further complicated by the fact that conventional musical notation is neither consistent nor very logical. It has grown up over a long time and has more to do with the history of woodwind instruments than with mathematics or computers.

One of the few things that everybody knows about music is that there are eight notes in an octave. Since everyone knows it, you won't be surprised to hear that it is not true.

There are either seven notes or 12 notes in an octave, depending on whether or not you count the sharps and flats. The number eight comes in because you count eight whole notes from any given note to find the note of the same name in an adjacent octave.

The main notes are not evenly spaced in terms of frequency. Some but not all of them have a "half" note in between. Half notes are simultaneously the flat of a higher note and the sharp of a lower note, so that a B flat is the same as an A sharp.

Taking sharps (or flats) and the main notes together, the 12 tones in an octave are evenly spaced. This means that some "whole" notes are only spaced a "half" tone apart.

The actual frequencies of the notes are fixed only by the whim of human beings, and concert pitch has actually drifted upwards nearly half a note over the last few centuries. But the relationship between the octaves is fixed, as the notes in any given octave are exactly half the frequency of the corresponding notes in the octave above, and twice the frequency of their counterparts in the octave below.

This is the only musical fact with any convenience about it as far as computers are concerned.

Sounding off

The main Basic command for the sound system is SOUND, which is followed by a number of parameters. It is not necessary to specify all of the possible parameters, as there are default values for most of them, but you must specify at least two. These are the channel status and the tone period. For music, you will also want to specify the duration, but the remaining bells and whistles are not really required.

Going through channels

In lines 1110 to 1130 in the example program you can see that sound commands are issued to all three of the sound channels. The variables channela, channelb and so on are defined in line 30, where you will notice that the number for channel C is 4 rather than the 3 you might expect.

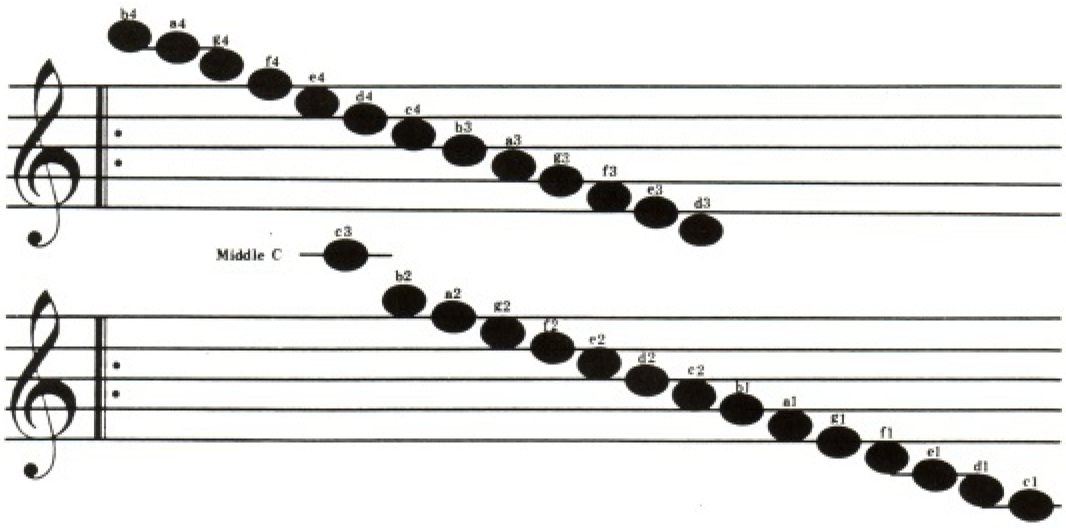
This is because the channel number is binary bit significant. This allows you to use a channel number like 6 to select both channel B and C together in one SOUND command. I haven't done that because I want the different channels to play different notes, so I send parameters to each separately.

Besides selecting the channel, the channel status parameter can be used to cause a note sent to one channel to rendezvous with a note sent to another channel, or a channel may be put on hold. These are features we needn't bother with for now.

Tone periods

The most important parameter for programming music is obviously the frequency of the notes, but the Amstrad system does not use notes or frequencies. To program t+sound generator to produce a particular frequency, you have to give it a number that represents the period of time required for each cycle of the desired frequency. This period is expressed in 1/125,000ths of a second.

Fortunately you don't have to work out these "tone periods" because there is a table of them in the appendix of the Amstrad manual. You will notice that these double or halve as you move from one octave to another, just like frequencies do, except that they are backwards. the larger numbers are the lower notes and the smaller numbers the higher notes.



You will also find a page in the appendix with the period numbers for the whole notes in the middle octaves arranged upon a pair of musical notation staves. This is a useful aid to transcribing musical notation into computer commands, but it is not much help with the sharps and flats.

Instead of looking up the numbers for each note in the example program, I found it much easier to prepare a few look-up tables in Basic arrays and make the computer do the hard work of finding the tone period numbers.

With the system used in the accompanying program each note is entered as two characters. The first is the note's "name" (actually a letter, from a to g) and the second an octave number from 1 to 4. This two character designation can have a + or – added to make it a sharp or flat.

In lines 2000 onwards I have set up two arrays. One (pchart, data in lines 2120 onwards) holds the tone period numbers for the four middle octaves most used in music. The other (scale, data in line 2110) is used to convert the names of the notes (a to g) into their equivalent position on the 12 tone scale. To put it another way, the scale array is used to look up a note's position in the pchart array.

The addition of a sharp or flat (+ or –) causes 1 to be added to or subtracted from the number found in the scale array. So an a3 becomes a 10, and an a3+ (a sharp) becomes an 11. This number is then used to pick out the right tone period from octave number 3 in pchart.

This is how my shorthand notations are located on conventional music staves, but notice how the octaves run from c to c, rather than a to a (not my idea, just musical convention). Note also that I have numbered the octaves differently from the manual's appendix, to avoid using negative octave numbers.

You can see in the SOUND commands that, after the tone period has been found in the arrays it is multiplied for one channel and divided for another. This is a simple trick that merely gives a richer sound, it is not really using the channels independently. Proper three channel sound, with chords and all, would require a bigger program with much more data.

Multiplying by two gives the same note an octave lower, which adds some bass emphasis. Dividing by three gives a higher tone, but it is not the same note in another octave, in fact the tone may not be in tune with any note at all. This is called a harmonic, the third harmonic in fact.

To hear what the tune would sound like without this reinforcement, just edit lines 1120 and 1130 to put a REM in front of the SOUND command. This will turn the line off without you having to re-type the whole thing to get it back.

The notes for the tune played by this program are stored in DATA statements in line numbers 1160 to 1470. Each note is followed in the data list by a duration number, separated by commas. Note that rests, which are musical durations with no sound, are coded as an r followed by a duration number.

If you find this particular tune is not to your taste, you can easily replace it with your own DATA statements. Don't forget the "end" in line 1470. This is an essential marker for the program. I found it easier to put each bar of music in its own line of DATA, to keep track.

Duration of notes

As well as the frequency of the note, the parameter which changes most often in music is the length of the notes. The computer expects these to be given in hundredths of a second, but musical notation is all semi-quavers and the like.

In the Basic program I have entered all the lengths of the notes as a single digit, where 2 stands for half a note (or minim), 4 represents a quarter note (or crotchet), 8 represents an eighth note (a quaver), and so on.

In musical notation you often have a dot after a note to indicate that it is half again as long as the note on its own, and in the program you may put a period after the digit to the same effect. The program figures out the fraction of the tempo variable that this notation represents, and the whole pace of the tune can therefore be varied just by changing the value of tempo.

The tempo variable has been defined in line 40. Note that it has been given a value that is easily divisible by 8 and 4 to give integer values for length. Try changing it to speed up the tune.

If we were to leave out the duration parameter the computer would default to a duration of one fifth of a second. If we specified zero it would default to the length of the specified envelope.

Volume control

There are a number of ways to set the volume of the computer's musical output. One is to twiddle the knob, another is to change the value of the initial volume parameter, and a third is to use an amplitude envelope. In this program we have specified an amplitude envelope, so we set the initial volume to zero, and let the envelope control the volume.

If you simply leave out the volume parameter, the computer defaults to a middle volume setting, so this parameter is optional.

Amplitude envelope

Because real musical instruments don't have a constant volume throughout a note I have elected to define two envelopes to control the shape of the

notes and hopefully make them sound more like a piano. This is done in the ENV commands in lines 50 and 60.

The first number after the ENV is the number of the envelope, the rest define the shape. If you want to know the details, it is all in chapter six of the manual. The only difference between the two envelopes I have defined is that number one is slightly louder.

Tone envelope

Tone envelopes can be used to add frequency variation to the tone, in much the same way as amplitude envelopes vary the volume. This is most commonly used to add vibrato or to make a note sound more like that of a real instrument.

I thought this was a bit of a luxury, so I have just included a variable (vibrato) for you to use if you wish. It is currently defined as zero, which specifies no tone envelope, and that has the same effect as just omitting the parameter. If you want to use a tone envelope you will first have to define one with the ENT command, which is similar to ENV.

Noise

A degree of white noise, or fuzz, may be added by specifying a number from 1 to 15. This is of more use in sound effects than for music. The same amount of noise is added to all three channels, and the channels cannot have individual noise settings. The default is no noise, but if you want to try it out, just define the variable noise to be between 1 and 15.

Program power

You could have a music program that consisted of line after line of SOUND commands, each with its own parameters labouriously typed in and just let the computer churn through them. This would be terribly inefficient, though, since the poor old CPU would just have to hang around waiting for the sound chip to finish droning and accept more instructions.

Furthermore, you would be wasting one of the Amstrad's nicest Basic commands. The ON SQ() GOSUB command will set up an interrupt-driven sound queue servicing routine which is called automatically when there is room in the sound queue for another sound instruction. In the meantime the computer can get on with something else.

In the example the computer spends most of its time in lines 100 to 150, engaged in artwork of a trivial if creative nature. These few lines are just to demonstrate that the sound queue subroutine requires no attention from the main program once it is set up.

You could have the main program doing your accounts or playing a game, and still have the sound routine playing away in the background.

There are a few points to watch when you set up a sound queue interrupt. You will notice that the command appears twice, once in line 90 and again in line 1140. This is necessary because the interrupt is disarmed each time it is "fired", and also whenever the SOUND command is used.

This is no problem, just remember to re-arm the interrupt again with an ON SQ() GOSUB before returning from the subroutine. The number in the bracket is a channel number. I have just used channel A, but you could set up separate routines for each of the three sound channels.

A final point to remember is that your foreground program mustn't mess up any of the variables used by the background routine. In our example, the data pointer is in constant use, finding notes in the DATA statements.

This means that you cannot use RESTORE or READ in the foreground program to founder. This fact is possibly less obvious than the point about the variable names, so take care.

```
1 REM Program By Iolo Davidson
10 INK 0,0:INK 1,23:INK 2,6:INK 3,18
20 BORDER 0:MODE 1
30 channela=1:channelb=2:channelc=4
40 tempo=128:vibrato=0:volume=0
50 ENV 1,3,5,1,1,0,8,10,-1,10
60 ENV 2,3,4,1,1,0,8,10,-1,10
70 GOSUB 2000
80 RESTORE 1160
90 ON SQ(1) GOSUB 1000
99 REM **** Foreground Program ****
100 FOR i=1 TO 20
110 FOR j=1 TO 3
120 DRAW RND*640,RND*400,j
130 NEXT j
140 NEXT i
150 CLS: GOTO 100
999 REM *** Background Sound routine **
1000 READ a$
1010 IF a$="end"THEN RESTORE 1160:GOTO 1
     000
1020 READ b$: length=tempo/VAL (b$)
1030 IF RIGHT$(b$,1)="." THEN length=len
     gth+length/2
1040 envelope1=1:envelope2=2
1050 IF a$="r"THEN envelope1=0:envelope2
     =0: GOTO 1110
1060 octave=VAL (MID$(a$,2,1))
1070 note=scale(ASC (LEFT$(a$,1))-96)
1080 IF RIGHT$(a$,1)="+" THEN note=note+
     1
1090 IF RIGHT$(a$,1)="-" THEN note=note-
     1
```

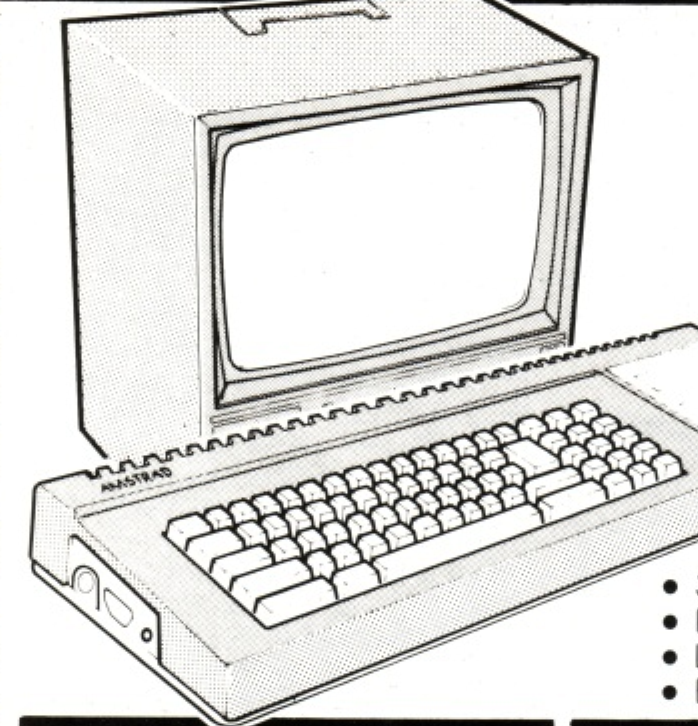
```
1100 tone=pchart(octave,note)
1110 SOUND channela,tone,length,volume,e
     nvelope1,vibrato,noise
1120 SOUND channelb,tone*2,length,volume
     ,envelope2,vibrato,noise
1130 SOUND channelc,tone/3,length,volume
     ,envelope1,vibrato,noise
1140 ON SQ (1) GOSUB 1000
1150 RETURN
1160 DATA g3,4.,f3+,8,e3,4.,f3+,8
1170 DATA g3,4,a3,4,b3,4,g3,4
1180 DATA c4,4,b3,4,a3,4,g3,4
1190 DATA f3+,4,e3,4,f3+,4,d3,4
1200 DATA g3,4.,f3+,8,e3,4.,f3+,8
1210 DATA g3,4,a3,4,b3,4,e4,4
1220 DATA d4,8,b3,4.,a3,4.,b3,8
1230 DATA g3,2.,r,4
1240 DATA g3,4.,f3+,8,e3,4.,f3+,8
1250 DATA g3,4,a3,4,b3,4,g3,4
1260 DATA c4,4,b3,4,a3,4,g3,4
1270 DATA f3+,4,e3,4,f3+,4,d3,4
1280 DATA g3,4.,f3+,8,e3,4.,f3+,8
1290 DATA g3,4,a3,4,b3,4,e4,4
1300 DATA d4,8,b3,4.,a3,4.,b3,8
1310 DATA g3,2.,r,4
1320 DATA a3,4.,g3,8,f3+,4.,g3,8
1330 DATA a3,4,a3,4,r,2
1340 DATA d4,4.,c4,8,b3,4.,c4,8
1350 DATA d4,4,d4,4,r,2
1360 DATA d4,4.,c4,8,b3,4.,c4,8
1370 DATA d4,4.,c4,8,b3,4.,c4,8
1380 DATA d4,8,e4,8,d4,8,c4,8,b3,8,a3,8,
     b3,8,c4,8
```

```
1390 DATA d4,4,d4,4,r,2
1400 DATA e4,4,e4,4,d4,4,d4,4
1410 DATA c4,4,c4,4,b3,4,b3,4
1420 DATA a3,8,b3,8,c4,8,b3,8,a3,4,g3,4
1430 DATA f3+,4,e3,4,f3+,4,d3,4
1440 DATA g3,4.,f3+,8,e3,4.,f3+,8
1450 DATA g3,4,a3,4,b3,4,e4,4
1460 DATA d4,8,b3,4.,a3,4.,b3,8,g3,2.,r,
     4
1470 DATA end
1999 REM *** Set Up Note Arrays ***
2000 RESTORE 2110
2010 DIM scale(7)
2020 FOR i=1 TO 7
2030 READ a:scale (i)=a
2040 NEXT i
2050 DIM pchart(4,13)
2060 FOR i=1 TO 4
2070 FOR j=0 TO 13
2080 READ a: pchart(i,j)=a
2090 NEXT j
2100 NEXT i: RETURN
2110 DATA 10,12,1,3,5,6,8
2120 DATA 2025,1911,1804,1703,1607,1517,
     1432,1351,1276,1204,1136,1073,1012,
     956
2130 DATA 1012,956,902,851,804,758,716,6
     76,638,602,568,536,506,478
2140 DATA 506,478,451,426,402,379,358,33
     8,319,301,284,268,253,239
2150 DATA 253,239,225,213,201,190,179,16
     9,159,150,142,134,127,119
9999 SPEED WRITE 0: SAVE "music":GOTO 99
     99
```

ACU

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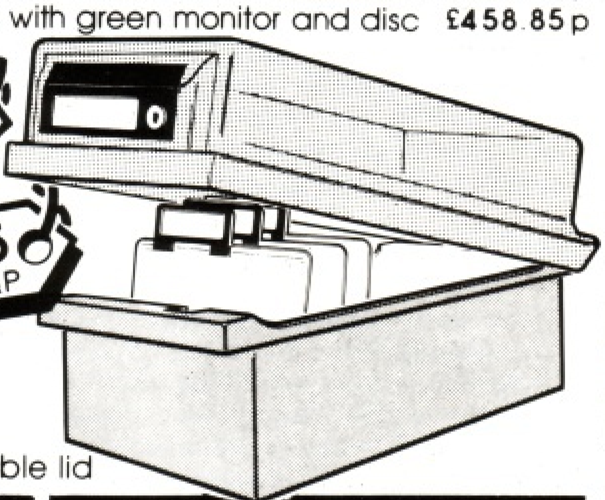
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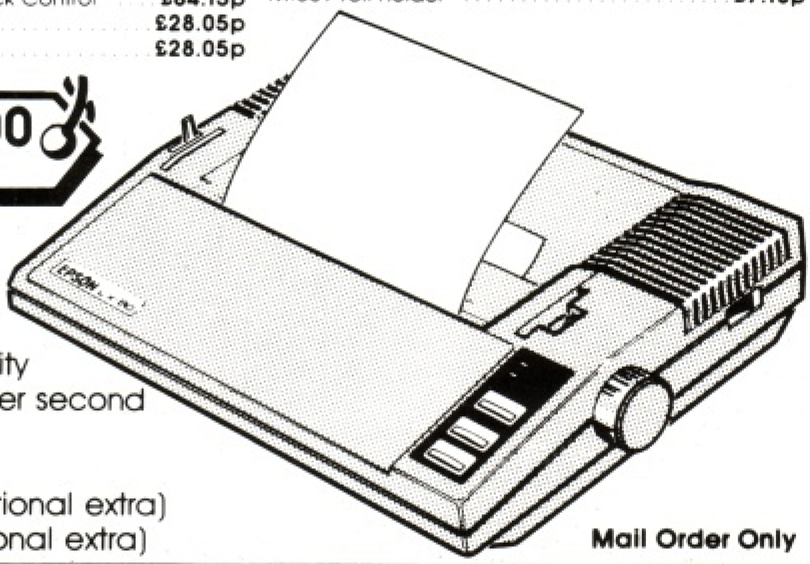
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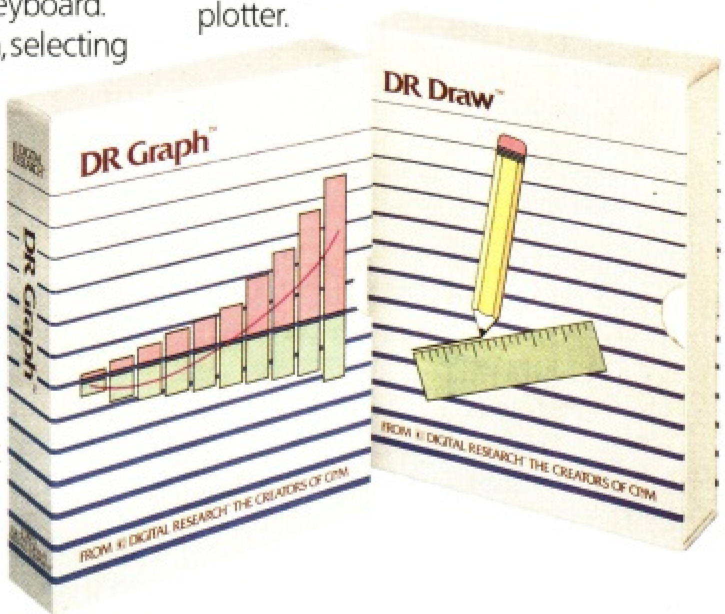
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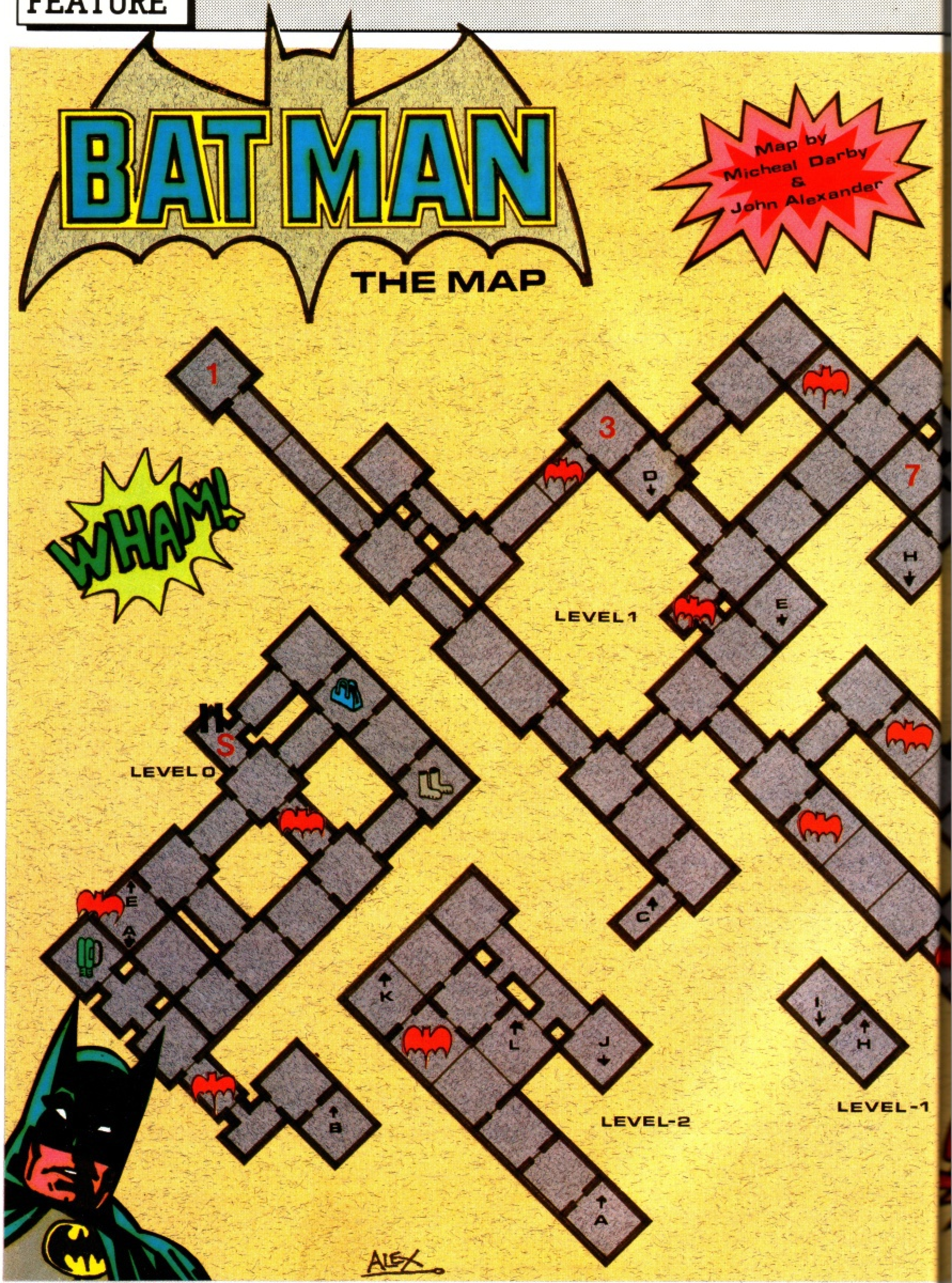
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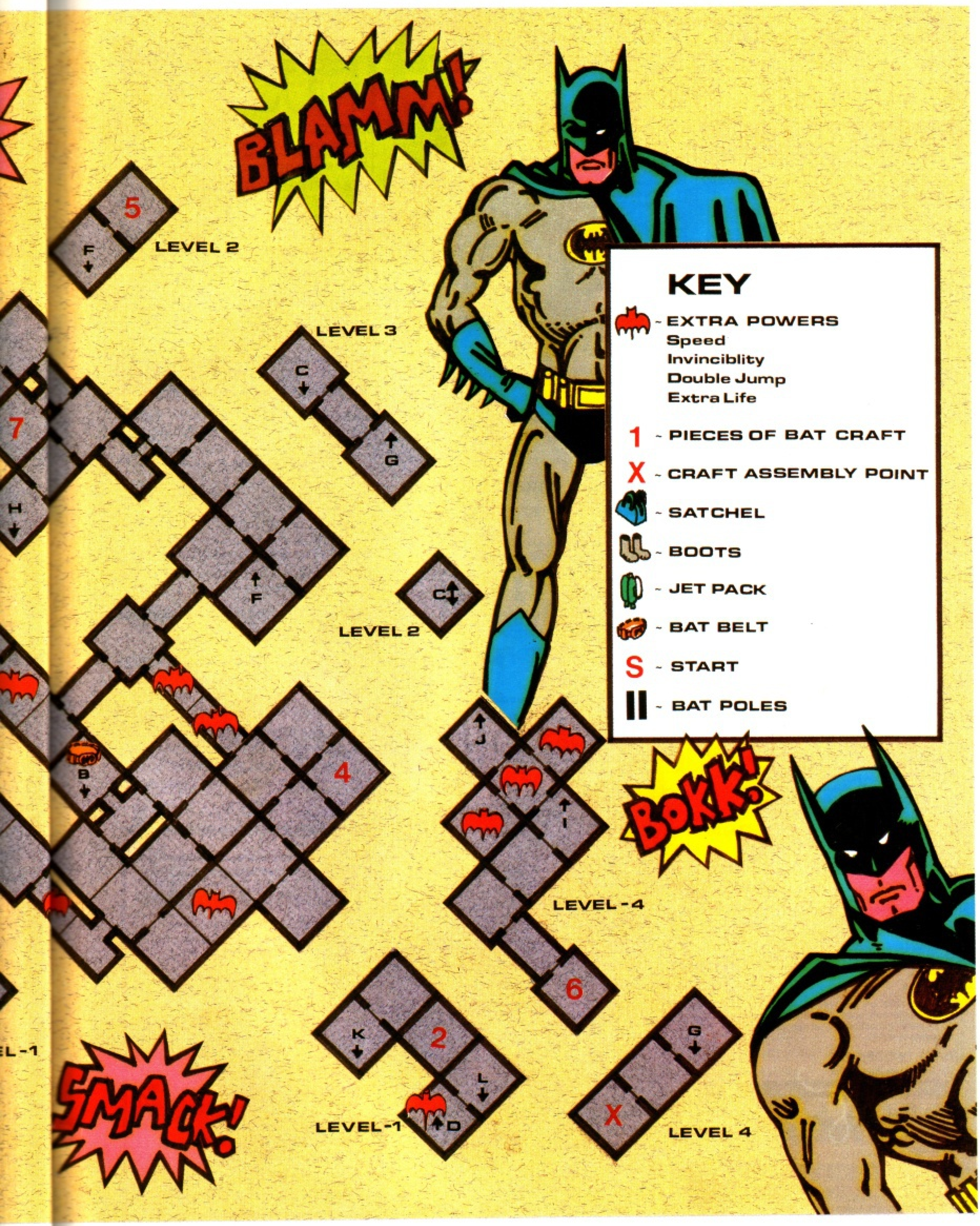
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In search of Biggles

Jeremy Spencer goes shopping – and discovers Dalali

I'm standing ankle deep in old lettuce leaves, squashed tomatoes and a few broken cucumbers, my every attempt to move frustrated by anxious stall holders forcing their wares on me. 'He'yar guv, five lemons fer only twenty pee".

"Er no thanks . . . oh yes all right – and can you tell me how to get to Dalali?" "Wurs that then guv?" "Well I don't know. It's a software house". "Never 'erd of it mate. 'Ere y'are, five lemons".

I learnt one thing – nobody in the Croydon fruit and vegetable market had ever heard of Dalali. And, on reflection I have to admit I am not altogether surprised. Three days ago I hadn't heard of them either, and yet I had enjoyed playing the games they had converted on to the Amstrad more than any others.

Ahh, found it!

It wasn't an imposing building. It didn't even have an imposing doorway. I thought about ringing the bell, but since it had one of those funny speaker things, and I'm a bit shy about talking to walls, I thought it better just to wander in and surprise everyone. It was I who was surprised.

Hanan, the director of Dalali, was a veritable princess – not at all the sort of person you would expect to find running a successful software house in a cut-throat industry.

Hanan is a Palestinian. She came to England to study at university and moved to America to take her Master's degree in maths and operational research. Her business card doesn't display any of her many qualifications which speaks volumes about her natural modesty.

Hanan is no doubt well qualified to work with computers but I was more than a little curious to discover how she ended up in this neck of the woods, producing games software.

"It was Humpty Dumpty's fault. After a short time with ICS 'Arabising' computers I went to Thorn EMI, and saw this Humpty Dumpty jigsaw game. I was amazed by the sprites moving all over the screen – in front of each other, behind, in every direction. I just had to find out how it was done. From that day I was hooked".

Modest beginnings

Dalali's early work included the writing of two original games, both of them before the Amstrad became so important. Special Delivery was a Christmas game but the marketing company failed to market the game at Christmas so, not surprisingly, it wasn't a success.

After completing Gene Genie on two machines, for MicroMega, Dalali moved into conversion work "for survival". One of the earliest – and most revered – works was Boulderdash. Dynamite Dan was their second task and again the Dalali team surpassed themselves.

"We learnt a great deal from doing all this conversion work, lots of very useful techniques. But on the whole I prefer doing original work".

Potentially Biggles is their most interesting project because it is their own creation even though they still feel constrained by having to tie in with the film.

Too busy running the business

Hanan doesn't spend her time writing games, or even playing them. "I'm far too busy running the business. I might get involved in one project if it interests me, but my main task is making sure that everything is done on time and making sure we don't run into any problems".

Finding the right sort of programmers is a time consuming task. "We can't rely on freelance programmers, not unless they are prepared to come and work on sight so we know what they are up to. That way we might be able to instil some sort of discipline into them, worthwhile even though it's pretty hard work".

There's no doubt that behind her elegance Hanan is something of a task mistress. I pity any programmer who tried to fob her off with some lame excuse wrapped up in jargon and mumbo-jumbo. Her expert knowledge of computers would very quickly come to light.

Coping with programmers is as nothing when it comes to dealing with publishing companies. "When we take on a conversion we can spend up to four weeks analysing the task to see what can be done and what can't.

"In that time we will produce a detailed timetable showing what part of the conversion will be done and when for the sake of sanity on both sides. They know that in week three they will see a dot on the screen – before that they won't see anything.

"Sometimes the clients will ask for some small but far reaching technical changes to be made, and when we point out the implications they don't want to know, until they see the implications after the changes have been made. The time taken to make these changes and perform all manner of fine tuning falls outside our original timetable – we don't get paid for it".



Hanan, second from left, with three members of the Dalali team

The production department

The factory floor is a rather spacious office. Around the walls sit examples of just about every home computer you could imagine. Linked to most of them are large aluminium boxes, some with disc drives, some without. I was assured that these boxes are in fact the mainstay of Dalali, the Gemini development system.

The code for each game can be put together using a Gemini and then downloaded to the target computer. All you have to change is the interface for the computer you are programming. Biggles on the Amstrad and Spectrum started life as the Commodore code. The advantage is that the main body of the game can be up and running, and then all they have to do is rewrite the graphics system and fiddle with the sounds to get the maximum effect.

Bizarre ideas for Biggles

The Biggles project appeared at Dalali more by luck than by judgement. "We were one of four software houses who were asked to do story boards for it. We decided that the task was impossible, there just didn't seem to be enough time. So we came up with some bizarre ideas and to our surprise they liked them.

Out into the market

Picking my way over the remains of the day's fruit and vegetable market I couldn't help hoping that Dalali's corporate modesty wasn't going to keep them hidden away for much longer. Given the chance to produce original games, they have the essential ingredients of talent, imagination, skill and wit to turn out something quite special.

At any rate, from understanding Humpty Dumpty to creating Biggles – in two years – is not bad going.

Biggles

James Bigglesworth, the hero of many a schoolboy since time immemorial, has had very little to cultivate his fame over the past 15 years. Well now the all-time, very English hero is about to be dusted down and brought out into the harsh light of the 1980s in the form of a film and a game of the film from Mirrorsoft.

Captain W.E. Johns wrote nearly 100 books based on the antics of Biggles. So many, in fact, that his public began to wonder whether he would run out of titles, but Johns always managed to find new directions in which to send his modest superhero.

He thought of them all, except one – time. Biggles – The Untold Story, has our super hero dabbling, unwillingly in time travel.

New York, a good place to start a film

The film begins in New York where Jim Ferguson (played by Alex Hyde-White) has his home. Jim is a time-twin of Biggles. The implications of this relationship become clear when Jim is sent hurtling through time to arrive on the battle fields of First World War France – just in time to see Biggles crash his biplane.

Despite being disorientated by his journey of more than 6,000 miles and 70 years, Jim doesn't hesitate in pulling Biggles from the wreckage. Before the two men get a chance to get acquainted, Jim finds himself thrown back into his own time slot none the worse for his experience.

Much to Jim's annoyance this sudden hurtling back through time is to become a regular feature of his life. Every time Biggles gets into a scrape he has to go and sort him out. For a man who's only concern is launching fast food services these sudden flights of fancy are a trifle inconvenient. It isn't until Jim can be persuaded to visit Colonel Raymond (Peter Cushing) in London that the strange events are explained to him. From which point Jim and Biggles are destined to save the world from the ravages of the sound weapon.

Side A, a good place to start a game

The game is divided into two parts. Side A is the arcade section being written by Dalali. On side B you will find the now almost obligitory Mirrorsoft flight simulator, written by the same chap who put their Harrier game together.

The arcade game is itself divided into three sections depicting three of the action sequences from the film. In the first section you must guide Biggle's plane over the enemy lines, evading flak and German fighter aircraft.

They throw everything they have at him. Jim is your gunner so he can take care of the enemy aircraft while Biggles has to fly skilfully winding his way past the starbursts from the ground fire. If you survive this little First World War jaunt – and the chances are you won't, not at first at least – you will experience a blinding flash as you move through time to your next task.

Biggle's second dilemma takes place at the weapon test site Blanchfleur. The whole area is heavily guarded and the only chance of escape is by your guiding Biggles in a Commando type arcade sequence.

The grenade throwing action is one of the most realistic you are likely to see in a long time. It's well worth getting into a scrap like this just to see it, although you might not agree when you have to face poison gas traps and rockfalls because the grenades won't help you.

In the unlikely event that you live to see the end of the second game you will be transported into the third and most demanding game. Biggles and Jim find themselves back in modern times, on a rooftop. Although they are actually trying to save humanity the police aren't aware of this because they are trying to shoot them.

Your task is to make your way across the rooftops to a secret location and secure the photographs of the weapon site for use in the final part of the game.

If you manage to recover the photographs then Jim and Biggles can steal the police helicopter that lands on the roof and make their way back to 1917. Don't worry if you have never flown a helicopter before, at least you have seen one, and that's more than poor old Biggles can claim. Using the recovered photographs you will have to navigate your way to the weapon sight and destroy it – but not before surmounting a number of very nasty problems.

The game attempts to follow the film by putting you through the same nasty experiences suffered by Biggles and Jim, in the same order. But the game differs from the film in one major detail. In the film Biggles is played by Biggles – so he succeeds. In the game you play Biggles so you will probably make a complete pig's ear of the whole thing. After all, super heroes don't grow on trees you know. ACU

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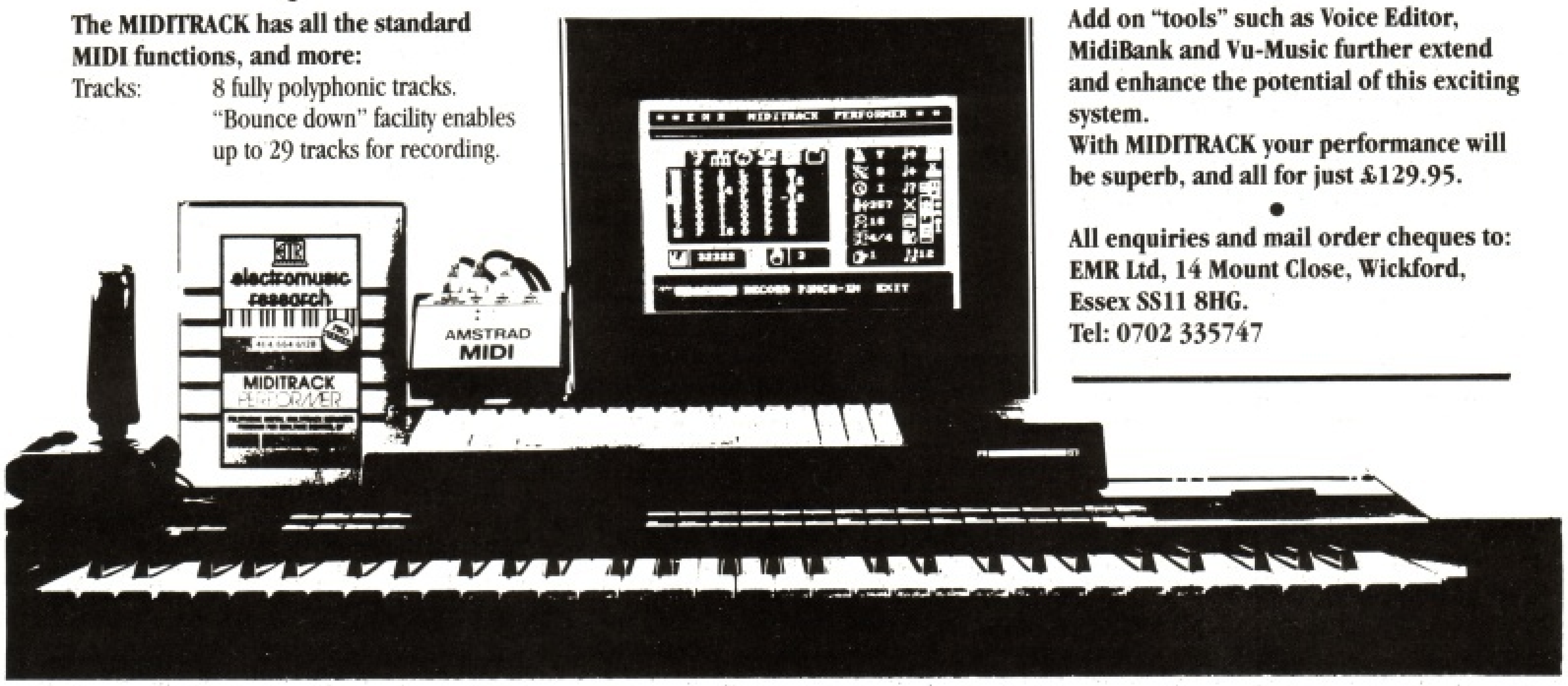
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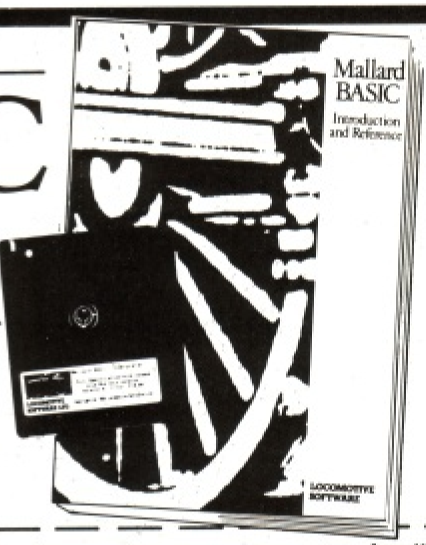
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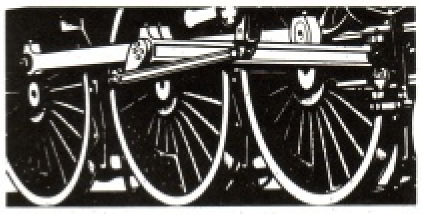


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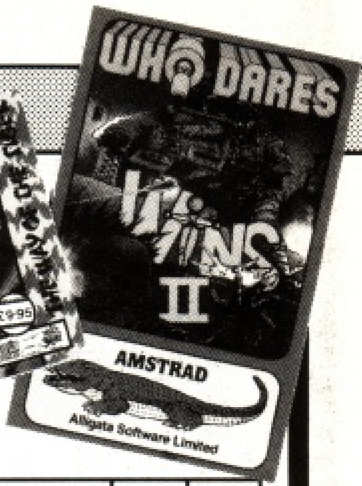


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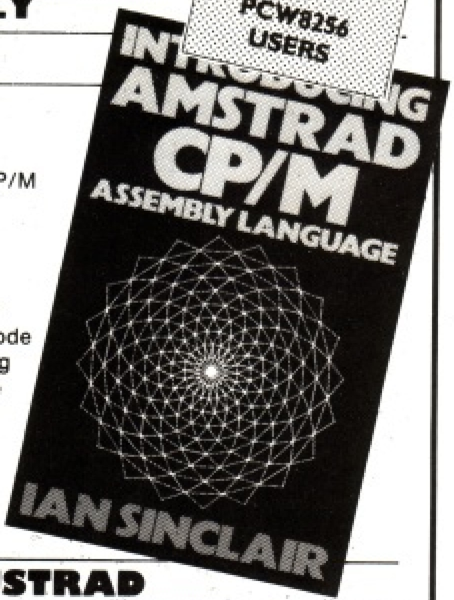
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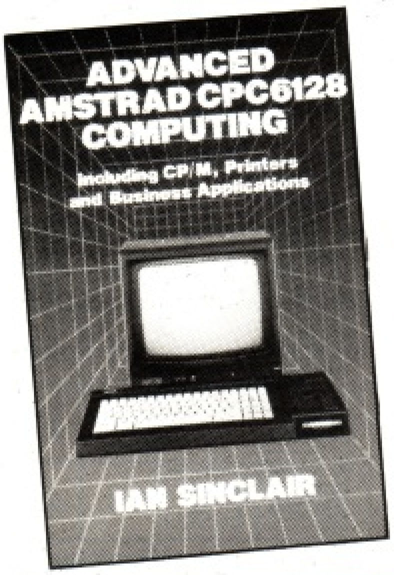


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GOING LOCO

Alex Martin takes a look at keys and reading the keyboard.

There are several ways in which the keyboard can be read from Basic on the CPC machines. At the lowest level individual keys can be examined to see if they have been pressed.

At one level up, the whole keyboard can be scanned and a key read from it. At the highest level a whole string can be read and edited as it is typed in. In addition to this the state of the joystick can be determined.

Input

Maybe you think you know all about INPUT. Did you know that the question mark that appears after the prompt is optional?

Did you know that you can sling in a semicolon before the prompt string that does magic things? You didn't? Why not?

Let us take a look at the highest level keyboard command INPUT. This is a standard command found in all versions of Basic and under other names in other languages. Its purpose is to provide a simple way of getting information into the computer. Here is an example:

```
INPUT a$
```

This prints a question mark on the screen and waits for a string to be typed in. The string can be edited on screen using the usual editing facilities of the computer including the copy cursor.

It must be finished by pressing Enter. The result gets put into the variable *a$* and because *a$* is a string variable it will accept anything typed in.

However you should note the special effect a comma has. A comma separates two items that are being input. An example of this would be INPUT a$,b$ which requires two items to be typed in separated by a comma.

If the wrong number of items is typed in then the INPUT command prints the message "Redo from start" and starts again.

Other types of variable can be used in the INPUT command and mixed in its list– for example, INPUT a$,a%,a!.

The items input must conform to the types specified in the list. If the INPUT command is expecting an integer and you type in something with a letter in it, it will again reject this with a "Redo from start" message.

An INPUT command can have a prompt string specified. This is to tell the user of the program what information to type in. Here is an example:

```
INPUT "Type in your name";name$
```

This prints "Type in your name?" and waits. The question mark rather messes things up, so to get rid of it, use this form of the same command:

```
INPUT "Type in your name",name$
```

Spot the difference? INPUT commands can be made to appear on the same line one after another. A carriage return and line feed usually follow an INPUT command, making the next thing to be printed appear on the next line. If a semicolon is included before the prompt string, no carriage return and line feed is issued and the next thing to be printed is placed on the same line.

What do you do if you really want to enter a string with a comma in it – like an address or a list of items that all need to go into one string? To do this you will need to use the LINE INPUT command. This works in exactly the same way as INPUT except that it allows only one item to be input and only into a string variable.

That concludes our examination of INPUT. If you're still awake let's go down a level and look at the keyboard buffer and INKEY$.

The keyboard buffer

Your computer contains a keyboard buffer (No, you can't see it through the holes in the back). This is a piece of memory set aside for storage of characters.

The characters are derived by looking at the keyboard to see which key has been pressed and then looking up the key in a table and finding out which Ascii character (or string of characters) has been associated with that key. The character or characters are then placed into the keyboard buffer.

All this happens magically even when the computer is busy doing something else. So if you set up a program that keeps the computer busy and bash away at the keyboard the buffer will fill up. The stored characters will all be regurgitated as soon as the computer gets the opportunity. The following little ditty does this:

```
10 FOR n=1 TO 10000:NEXT n
20 INPUT a$
```

Run this and press some keys. As soon as the loop finishes and the program executes the INPUT command the stored characters are read out of the keyboard buffer and appear on the screen ready for you to edit.

INKEY$ is a function that returns the next character available from the keyboard buffer. A statement that says:

```
a$=INKEY$
```

will place the character into *a$*. If there are no more characters available then *a$* will contain nothing (an empty string). A group of instructions often used in programs is:

```
10 a$=INKEY$
20 IF a$="z" OR a$="Z" THEN x=x-1
30 IF a$="x" OR a$="X" THEN x=x+1
```

As explained in the April, 1986 issue of *ACU* this eats memory space. The above program can be turned into this:

```
10 n=INSTR("ZX",UPPER$(INKEY$))
20 IF n=1 THEN x=x-1
30 IF n=2 THEN x=x+1
```

This has the advantage of not creating a new string and therefore avoiding garbage collection. In the past this has been taken a stage further and instead of the:

```
IF n=1 THEN
```

type of statement,

```
ON n GOTO
```

has been used. This can be taken even further by incorporating the statements in line 10 into the ON n GOTO command.

```
10 ON INSTR("ZX",UPPER$(INKEY$)) GOTO 30
   ,40
20 STOP
30 x=x-1:GOTO 20
40 x=x+1:GOTO 20
```

If Z or X is not found then the program drops through to line 20. If you are typing these programs in, none of them actually does anything useful – they are just to illustrate methods of reading the keyboard. I recommend the last method for programs that both read the keyboard and update the screen at the same time, as it is fast.



Press any key to continue

Another commonly used statement in a program is this:

```
10 IF INKEY$="":THEN 10
```

This waits until the next key is pressed. A more elegant way of achieving the same result would be:

```
10 WHILE INKEY$="":WEND
```

If there are characters sitting around in the keyboard buffer then this routine will accept one and continue the program. This isn't very useful when the idea is to halt the program and wait for a key press. So to get around this a similar routine is used.

```
10 WHILE INKEY$<>"":WEND:WHILE INKEY$=""
   :WEND
```

This will flush the buffer and wait for a key. Basic 1.1 has a special command called CLEAR INPUT that flushes the buffer.

The joysticks can be read using INKEY$. If the joystick is plugged in, the arrows that appear on the screen when the stick is moved can be tested for.

Let us now take a look at the lowest level of keyboard reading. The function INKEY – different from INKEY$ – tests a specific key on the keyboard. Try the following:

```
10 PRINT INKEY(1):GOTO 10
```

A whole load of –1s go whizzing off the screen. What heppens if you press the cursor right key? What happens if you press Shift and Control and the cursor right key?

INKEY(1) returns the current state of key number 1 which is the right pointing cursor key. If Control or Shift or Control and Shift is pressed at the same time, the number returned by this function is modified. Look up the function INKEY in your user manual for the five values that can be returned.

INKEY returns values of 0 and –1 to indicate "key pressed" and "key not pressed". These values are like those returned from testing some condition or other. So, it is possible to use these to control a program.

```
10 a=INKEY(1):b=INKEY(8)
20 IF a THEN 30 ELSE x=x+1
30 IF b THEN 10 ELSE x=x-1:GOTO 10
```

Or alternatively:

```
10 IF INKEY(1) THEN 20 ELSE x=x+1
20 IF INKEY(8) THEN 10 ELSE x=x-1:GOTO 1
   0
```

INKEY lifts up the corner of the keyboard scanning software and gropes around underneath until it finds the value it's looking for. It has no effect on the rest of the things that happen to the keyboard so if you use INKEY and then go on to use INPUT, you'll find you have a keyboard buffer full of rubbish.

If you happen to be scanning the cursor keys, your cursor will whizz around the screen as the control codes are executed.

It is worth pointing out that INKEY scans a specific key rather than looking for a character, so it doesn't matter what the key produces – just whether it is pressed or not. This means that the Shift and Control keys can be scanned independently.

Oh joy!

Also at this level it is possible to read the joysticks. The function that does this is illustrated in this program. Run it and wiggle the joystick if you've got one.

```
10 PRINT JOY(0);CHR$(13);:GOTO 10
```

Joy(0) reads the first joystick and returns a number. Here is a program that reads the joystick and plots a point on screen.

```
10 DEFINT a-z:b0=1:b1=2:b2=4:b3=8
20 a=JOY(0)
30 x=x+((a AND b3)/b3)-((a AND b2)/b2)
40 y=y+(a AND b0)-((a AND b1)/b1)
50 PLOT x,y:GOTO 10
```

This is a bit complex, but fast.

Know your commands

Reading the keyboard is an important thing to learn on the road to being a programmer so it is worth spending a few minutes playing with the various commands.

When there is more than one way to read the keyboard, it is a case of "horses for courses" and choosing the right commands for the job. In general INPUT is for quick and easy typing in of any information. INKEY$ is to look for specific characters being typed in and is used for applications such as selecting from a menu. INKEY is to read specific keys and is used for games and real time applications. ACU



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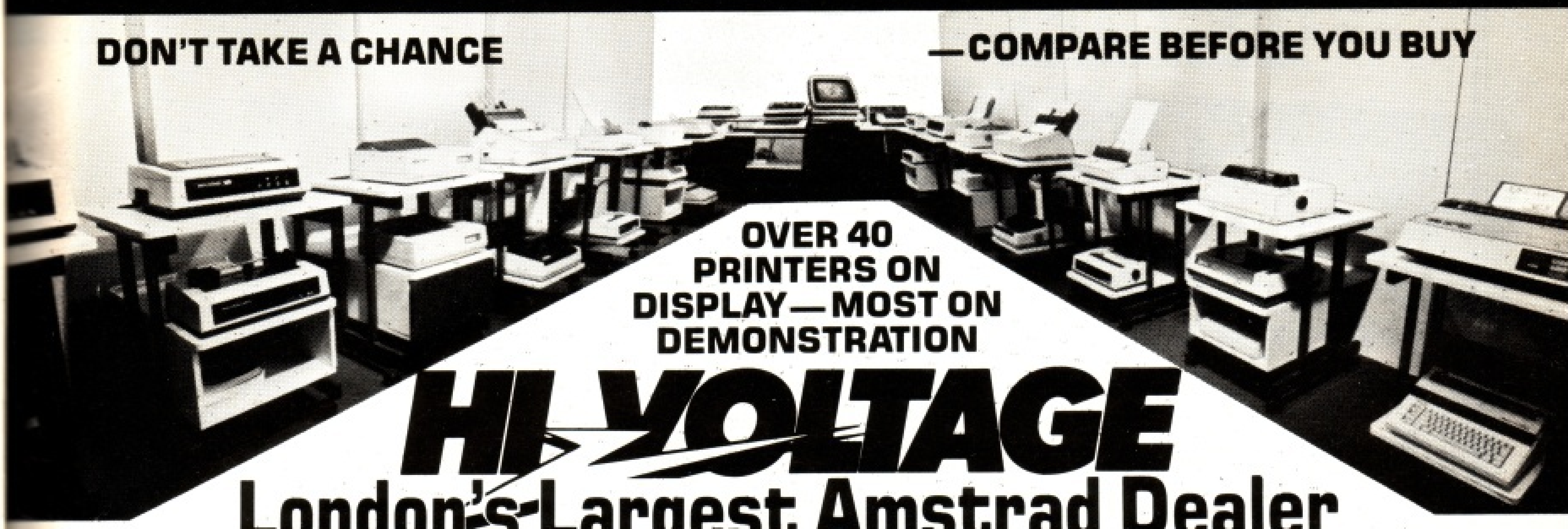
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ALIEN HIGHWAY – ENCOUNTER II



Hot on the heels of Highway Encounter, Vortex has just released Alien Highway – a game using the same graphic techniques but with a slightly different gameplay. It's possible that in the same way people didn't go for Alien 8 because of its similarities to Knightlore, so Alien Highway may not be received as favourably as it would be if the idea were completely original. This would be a shame as there is nothing wrong with re-using a good idea.

As in Highway Encounter the idea is to make your way along a road that connects over many screens. Instead of having five incarnations, your single Vorton has an energy level shown on a bar graph. When this reaches rock bottom you say your prayers. Bumping into the baddies or the electrified road edge depletes your energy while it can be increased at one of the regeneration stations along the way.

The whole aim of the game is to push your square funnel-shaped Terratron into each of seven regeneration stations along the way. The eyeball shaped Zeds are very similar to one of the creatures from Highway Encounter but the others are quite different. There are vertically elongated elliptical baddies that stick to fixed paths – the Zeds wander about all over the place while the kamikaze diamond-shaped ones come straight for you. You seem to have limitless fire power but as before the shots come in threes.

In the previous game there was some strategy involved planning which objects to push on to the next screen to block a fixed path monster. Because you're on your own in this one this aspect isn't as important. One annoying thing in Highway Encounter was that you might never get to see the screens in the early zones but in Alien Highway the screens are arranged in a different order each time you play. This has two effects – firstly you get to see, play and practise more of the screens and secondly you can't predict what will be where on the following screen. It also leads to a greater range of scores if you happen to get an easier selection of screens before being killed.

The scenery off the edge of the road is much more hi-tech and Habitat looking than in Highway Encounter and the excellent loading screen gives a similar sort of sci-fi feeling to the whole thing.

Just a quick mention of the loader – as before, Vortex has used one of those speed loaders that guarantees hours of fun for 664/6218 owners before they actually get the game loaded. Keyboard bashers will be happy to know that the game can be played on either keys or joystick, though the latter is infinitely preferable. Control of the Vorton is of the rotate and push forward variety which can be a bit tricky initially.

Author: Vortex.
Price: Cassette £8.95. Disc £13.95.

Colin

What was Vortex supposed to do when it had already produced one of the top five games for the Amstrad? Why produce another one of course, which is just what they have done.

Alien Highway is perhaps better than the first as the authors have had a chance to find out what people liked and disliked about the original. I guess it would have been a bit too easy if the edge of the road had remained unelectrified but it was this that killed me off almost every time and I began to wish it had been left as before.

The graphics as you'll already know are in Mode 1, which always gives a nice look to a game even if it does limit the use of colour. The sound is a slight disappointment but the noise when you kill someone is so good that background music might have spoiled the effect.

All round I think this is destined to become one of the best sellers – I, for one, wouldn't hesitate to buy a copy. You'll be happy to know there is a sequel planned, "Revenge of the Aliens – Encounter 3" but this isn't due until sometime in 1987 if the programmer finishes it.

I must complement Mark Haigh-Hutchinson on his taste in music – the boss is still the best!

19/20

Liz

I loved the original Highway Encounter but partly because it was that – original. With books and films the sequel rarely lives up to expectations and with Alien Encounter this is also true.

I found myself looking for differences the whole time and those I found didn't seem to affect the gameplay – you can move the bomb sideways and the random screens make it more fun for the first few goes but that's about it.

Vortex used to be known for innovation – it will lose its reputation like this. That said, Highway Encounter was brilliant, if you didn't play it you have definitely missed out and should buy this instead.

14/20

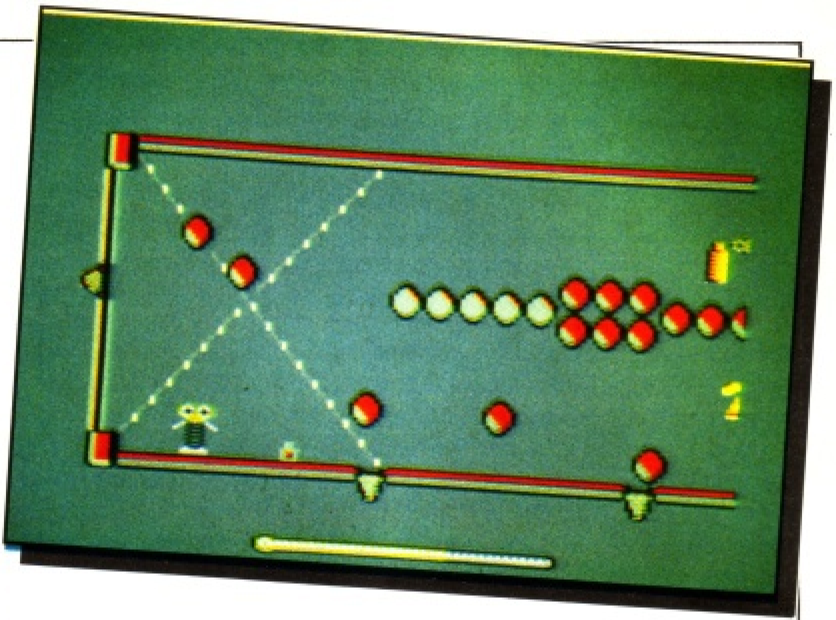
Nigel

I hated Highway Encounter and I hate this too. I just can't get anywhere using the daft controls. I have never got used to playing games diagonally. Rotate and forward might as well be translated to randomise and bump-into.

Okay, maybe it's a bit harsh to blame a game for my own lack of coordination but either way I don't find Alien Highway all that interesting.

Certainly I admire the graphics and animation which are of the highest quality, but there is very little to capture the imagination and make you go back for more.

2/20



THING ON A SPRING

To call Thing on a Spring a platforms game would be an insult. It is sort of a platforms game but it is to Manic Miner what West Side Story is to Romeo and Juliet.

Thing on a Spring has you taking on the role of Thing. Your task is to save an unsuspecting world from the evil goblin (wasn't that an old Dr Who plot? – Ed). The aforementioned goblin is working from his underground factory deep in the bowels of the Earth. Thing has got into the factory but doesn't know his way around, you are bound to get lost and end up stuck within the game.

To work out how to conquer the evil goblin you need to collect all nine pieces of a jigsaw which has been cut up and distributed throughout the building. The standard system of three lives and a bonus every 10,000 seems to be about as trendy as flares at the moment, so being a very fashion conscious Thing on a Spring your life is measured in oil. To stay alive you need to keep your spring oiled (I once knew an artist who worked in oils).

The whole game is accompanied by a Benny Hill-like tune, one of the few pieces of music on the Arnold which actually adds to the game rather than being an annoyance.

As you enter each new room the soft platforms re-appear but any object you have collected will stay in your possession. There is a good variety of sprites, some Spectrums, little cars, ducks and trains – all very cute but none quite as user-cuddly as Thing himself.

The animation is brilliant – who could fail to love Thing as he bounces around the screen, somersaulting over blocks and sliding down ramps?

Author: Gremlin Graphics
Price: £8.95

Colin

I'll bet 464 owners reading this get sick of us moaning about mickey mouse loaders that make it difficult to load some games. But if you, like me, have either a 664 or a 6128 then you'll probably want to know which games to avoid to save yourself hours of hassle trying to load them. Unfortunately Gremlin haven't exactly enamoured themselves to me by making Thing on a Spring one of these.

Fortunately I have access to several 464s and have been able to assess the game which is actually quite a good idea. It could almost be described as a platform and ladders game though most of the scenery is about twice normal size.

What makes it interesting is the character you control. Instead of the usual walk left, walk right and jump, he turns somersaults in either direction or can be coiled up and released to jump vertically. This makes control a bit like Nodes of Yesod on the Spectrum (well I had to mention Sinclair somewhere).

Graphically the game is very colourful but perhaps a bit chunkier than it need have been even though it's in Mode 0. A reasonable buy for 464 owners.

17/20

Nigel

What is this obsession with bouncing that programmers have this month? With Bounder and now Thing on a Spring, everybody's bouncing! Oh well, if it's trendy . . . Boing, Thing on a Spring is really good, boing. Lots of cleverly designed screens, boing, make this a classic arcade game, boing.

The somersaulting Thing is brilliantly programmed, boing, and seems to make the most difficult obstacles simple, boing, once the problem has been worked out. Boing, the game isn't particularly polished, boing, with the screen scrolling showing a flicker at the side, boing.

The colours are randomly generated at some points and not used particularly well, boing. Having said that, boing, there appear to be many hours of pleasure in the game, although I don't know how many screens there are to explore, boing. Huff, puff, pant, that's enough bouncing. Don't be misled by first impressions, this is a game that grows on you.

19/20

Liz

Being a spring you need to be well oiled, come to think of it working on Amstrad User you need to be well oiled, and the temptation to pick up every oil can – regardless of need – was often my downfall. I am amazed that none of the other reviewers have commented on how frustrating it is if you get stuck and have to press Escape to get out.

At first I found Thing on a Spring too frustrating to be fun, but once I mastered bouncing I changed my mind. This is the best game I've seen for a very, very long time. I would class Thing on a Spring as my all-time number two (top spot still goes to Boulderdash).

It is a shame that Way of the Tiger has got all the hype from Gremlin Graphics and Thing on a Spring has been overlooked – it's a much more playable game. Maybe I lack the evil streak needed for the violent games – it's a cute Kermit-like face and lots of puzzles that I like.

20/20

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COMET

Just about everything gets cashed-in on these days, so when Halley's comet came around Firebird jumped on the bandwagon. Unfortunately they left their jumping a little late and the real comet had been and gone in the time it took them to write the game.

True to standard Firebird form Comet is available across a range of machines, the Amstrad version being one of the best. The scenario is like this. You are the ship's computer, piloting a manned probe to explore the comet. This consists of five simple games. You only get one life and have to win 20 games before you reach the comet. These are selected at random from the five types.

Your first task is to stop the dreaded germ bags from contaminating the oxygen supply. This is an asteriodsesque game. Your weapon is a spiked spinner which destroys the bags. There is a time limit which ticks away in large numbers as you try to grab the bags. The joystick control is good and the sprites fairly smooth. Early on this is a very simple game but as you progress the number of bags to catch multiplies without an increase in time.

One of the problems the real comet probe had to cope with was getting signals back to Earth. If the antenna had moved away from the receiving aerial the spacecraft would have lost touch. This would make it impossible to direct the antenna back on course and all that lovely data would have been lost.

In the game you are operating the dish from inside the craft – as it gets knocked by the lumps of stuff flying off the comet you have to redirect the antenna to give the best possible signal. This is done against a very rapid clock. Working the aerial is perhaps the most boring of the games.

The most confusing is the game where you have to control the life support system. Like *Amstrad User* this spaceship needs a constant supply of coffee to keep going. The well being indicator shows how happy you are while the bladder indicator shows if you need a "P".

Originality is not Comet's long suit, one of the best games is a version of Missile Command. The Earth's defence system has decided that you are a threat and has launched an attack. Your ship sits in the middle of the screen and the missiles come at you from all sides. You can fire anti-missile missiles. These cause an explosion to destroy the incoming assailants. There is a fair bit of inertia to the joystick control and you can't move your sights over your ship.

The fifth game is a little like the android control section in Paradroid, an excellent Commodore 64 game from Hewson. *(Good grief, we'll be doing adverts for Sinclair games next – Ed.)* You have to repair some circuits inside the computer by matching a binary pattern. To do this you have to send signals through wires.

When you reach the comet you have the usual task of saving humanity. This takes the form of destroying more germ bags. Your bullets are little stars. The comet surface bubbles and rotates – destroy enough germ bags and the world will be saved.

Author: Firebird.
Price: Cassette £7.95.

Colin

I like a game which is actually made of several simple games so that you are given a variety of different things to play. I also like a game with a bit of nostalgia interest so I can definitely award Comet two brownie points.

It's made up of five reasonably simple games but they make a nice collection, particularly one which is a bit reminiscent of Asteroids and another which is like a circular version of Missile Command.

The title screen with its Animator-like wire frame lettering is quite impressive and the whole thing seems to have a nice polished feel to it. Overall a very nice game.

19/20

Liz

Comet is a program which is more than the sum of its parts. The individual sub-games would shame any budget label but as a collection they don't seem half as bad. The scene when you reach the comet is by far the best – your bullets being particularly good-looking like the things you have to shoot or dodge in the Star Wars arcade game.

I hated the scene where you controlled the ship's coffee machine but loved the space missile sequence.

The icons along the bottom – including a girl known as Maxine Headroom – have no effect at all.

I would say that Comet is not particularly good value for money.

15/20

Nigel

Comet is one of a new genre of computer games that relies on the fact that if you lump enough naff games together they make one reasonable one. There are some neat touches in Comet that make the game quite entertaining but overall you probably won't want to play it much after the real comet has disappeared over the horizon.

Comet is just about good enough to stand on its own without the comet connection. At least Firebird can console itself that if the game doesn't sell this time, they can sell it next time the comet comes round.

14/20



TUBARUBA

Tubaruba – a name no doubt derived from the authors name, Tooba Zaidi – is a game in which you play the part of a mischievous schoolboy nicknamed Tubaruba. Being a real tearaway you are caught breaking a window and must collect the £50 needed to pay for its repair. Your disbelieving headmaster is so sure you won't achieve this that he has staked his Ferrari on it. (Who said teachers are underpaid?).

The whole game takes place in and around the school building where scattered money is to be found (I wish my school had been like that). There must have been some pretty novel experiments in the school biology labs because the building is also inhabited by the weirdest collection of monsters you could ever hope not to meet.

Tubaruba is reminiscent of the Wally series – Pyjamarama, Everyone's a Wally, and so on – but don't get the idea that it's an inferior copy. As well as walking about at floor level a jetpack enables you to reach the higher levels of a screen.

You can defend yourself by shooting elasticated chewing gum at your adversaries. How long you manage to last depends on whether you manage to keep your energy level out of the red. Bumping into the baddies or even shooting at them will deplete your energy while picking up any of the money or one of the food items will boost it.

Some screens can have eight or more sprites pitted against you, each of which is able to shoot small bullets travelling at unpredictable speeds. Whenever you are hit you explode in a most satisfying manner while your energy level once again takes a turn for the worse. Just to be topical – even though it was written last year – the game includes a Sinclair C5, a ride in which helps to add to your energy while carrying you across to a new screen.

As well as just walking/flying from screen to screen and the C5, there are also things looking a bit like kitchen cupboards which, when you bump into them, whisk you randomly off to some other screen.

The locations in the game are many and varied and cover most of the likely rooms in a school including laboratories and even lavatories. If you do amass the £50 necessary to pay for the window, you get to drive the Ferrari in a similar way to the C5, though I'd guess it's a bit quicker.

The game can be played with either a joystick or on the keyboard and will work on all CPC machines.

Author: Advanced Software Promotions.
Price: Cassette £8.95. Disc £13.95.

Colin

Although similar to the rather stale Wally series, Tubaruba has its own humour that makes it eminently playable. The author seems to be one of the few writing Amstrad-only originals and doing it really well.

The number of sprites that are moving at once on some screens is quite amazing, though also quite infuriating. Infact I had to take a closer look at the code for an infinite lives poke. There I found a message saying exactly when the program was written and also suggesting that I shouldn't bother looking for the DEC (HL), because there wasn't one.

As it happens, typing the letters T-O-O-B-A before the game starts makes you invulnerable so a poke isn't needed. Being invulnerable allowed me to travel round most of the screens. At a rough guess I'd say there must have been at least 50 or 60 which is pretty good considering the amount of detail in each.

I look forward to the next offering from the same stable and would recommend this one to anyone who doesn't already have one of the Mikro-Gen offerings.

18/20

Liz

When a game comes in from a new software house I tend to eye it with suspicion – most of the games from unknowns have been written, packaged and distributed by the programmer. However good the code, programs from small companies usually fall down on the packaging, instructions and presentation.

Tubaruba is the first product from Advanced Software Promotions, a company run by people who have plenty of experience selling other people's software. Their quality control has obviously been very good.

There are some nifty touches in this, the explosions are defender-like, the sound good, although the tune does start to wear a little thin after a while, and the gameplay is addictive.

17/20

Nigel

Wandering round rooms full of manic sprites accumulating objects isn't one of my favourite games, but this is one of the better ones. I especially like the explosions which happen far too often when I'm playing. It took me a few minutes to realise that going through windows wasn't fatal, despite turning funny colours and making disintegrating noises.

Often programmers take short cuts when writing games and they simplify things. It takes a great deal of time and effort to put in fiddly bits and frills. Tubaruba has lots of fiddly bits and is well worth a look.

17/20

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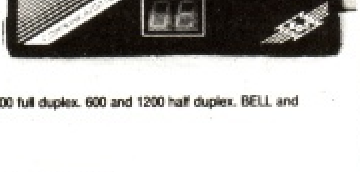
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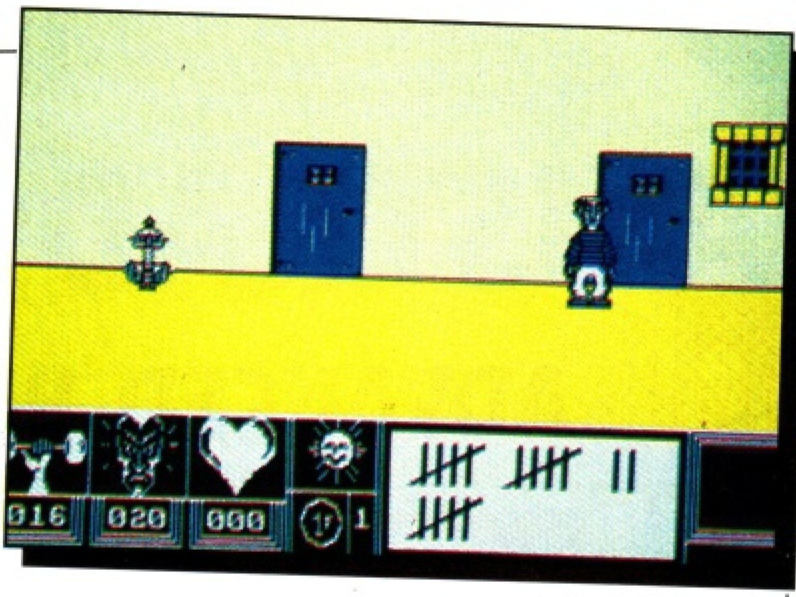
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DOMESDAY BLUES



Here's one for the jailbirds among you. In Domesday Blues you play the part of a prisoner waiting to be reprogrammed by a bunch of homicidal robots. Slung into a deep dark cell you must use all your faculties to escape and save the only girl left alive on Earth.

The game is an arcade adventure which starts by allowing you to allocate 100 points between strength, courage and fitness. The screen then displays the interior of your dismal cell. Using the joystick you get out of bed and explore. Moving around you may bump into the wall where the cartoon character sprite will say "ouch", or something similar in French.

Why French? Because the game, marketed in Britain by PSS, originally comes from France. In the cell, your character will find a hole in the wall, in which there is a franc.

The first real problem is how to get out of the cell. A few hearty kicks bust the door open and deplete your strength. So it is important to make sure you brought plenty of strength along with you. Through the door, you find yourself in a grey and dismal corridor (lots of atmosphere this game).

There are more doors to cells in the corridor and doors to other areas. The other areas contain robots which may or may not attack you.

Some robots don't move, but their presence makes your fitness decrease rather rapidly. When you are totally unfit you die. *(ACU would like to point out that this is just artistic licence and that totally unfit people should not be alarmed – Ed.)*

The current state of your health is displayed at the bottom of the screen and there are various things scattered around the complex which allow you to replenish these all important fitness and strength points. A drinks machine – which is why you need the franc – will provide you with more courage in the form of a cup of coffee. Drinking wine makes you fitter *(also artistic licence – Ed)* and eating builds up your strength.

During the game, the passing time is shown on screen as vertical scratch marks and it seems to be a good idea to have a little nap in a cell and wait for nightfall to explore certain parts of the complex.

From: PSS.
Cassette £9.95. Disc £14.95.

Nigel

Domesday Blues is a quite an interesting game. I guess the French connection is what gives it its air of originality. Initially it is quite fun to explore the prison, working out what should be done next.

However I soon got bored with re-entering the numbers for courage and so on after getting killed for the umpteenth time. The graphics aren't very impressive and the general feel of the game is not up to the same quality as, say, something like Batman.

The game does have some redeeming qualities and if sold at the right price can be good value for money. For me, the game is not really my cup of Pernod.

16/20

Colin

My view of the French has always been that they are a bunch of peasants who know as much about farming as I do about Siberian Yak cheese. Then they go and surprise us all by designing missiles to sink British aircraft carriers and beating the Americans at their favourite game, the great space race. The final straw has come when they start producing games software that is actually better than most of the home produced stuff.

Get Dexter could become a classic. Domesday Blues probably won't become such a smash but is certainly quite a fair game. I must at this point plead a little ignorance of the French language which is probably why it took me so long to work out what to do as I only had French instructions.

However as far as I can tell, you start off in your prison cell and the idea is to break out of gaol. The up section of the screen shows a rather strange 3D perspective view of the action while the lower part has various status information.

Overall a pretty fair attempt which will probably seem even better when someone in the office lets me see the translated instructions. But of the French stuff that's about to appear over here I'd suggest you wait and see Get Dexter.

15/20

Liz

By all accounts prison is a dull, lonely place. Domesday Blues conjures up the atmosphere perfectly. There seems to be a distinct lack of other prisoners but the vicious robots make up for the lack of guards.

The Mode 1 stipple is used to very good effect. If you have seen Spectrum I of the Mask you will know how shading can add depth to a shape.

L'Amstrad is number one in France and so most of the good software is originated on the Arnold. I suppose it is then converted to MSX and the native Thompson computers. Programs which start life on the Amstrad always seem that much better than conversions. All in all a good try.

14/20

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COMMANDO

Commando is a conversion of the arcade original. Having played both this and Who Dares Wins II (and seen Rambo) it's quite obviously the game to buy this season. Christmas saw the demise of the fighting game and before that was the decathlon era.

You control a little character who has the task of single handedly taking on the complete forces of an opposing army. You carry a machine gun with a seemingly limitless supply of bullets and start with six grenades with the possibility of picking up more and more without becoming weighed down. The idea is that you attempt to fight your way up each screen either avoiding or killing the opposition.

Unlike Who Dares Wins, the screen in this version is continuously scrolling rather than being split into a succession of separate screens. Though the scrolling does stop when you eventually get to the screen at the end of each section which cannot be passed until all the men there are killed. Along the way trees and rocks are dotted about the place providing some protection. Pressing the fire button shoots your gun and because there is a limitless supply of bullets it's best to just keep firing continuously.

The instructions erroneously state that grenades are thrown by hitting the space bar – in fact they are thrown in an identical fashion to WDW2, that is, the fire button is held. If you don't own a joystick, there is a redefinable key option as well.

On the way to the end of the first stage the scenery is quite bland, just trees and rocks, though there is a bridge where it is a good idea to toss a grenade over the top before going through shooting on all barrels. The last screen in this section is a real tricky one. As you near the top the fortress doors open and hordes of troops pour out firing in all directions. The best tactic is to move up to open the doors then retreat so you can drop a grenade in among the troops that begin to appear.

If you get through them the scenery starts to get more interesting with motorcycles, troop carrying lorries and tanks littering the landscape. There are also pill-boxes and fox holes that hide enemy soldiers making them very difficult to shoot (though a grenade often proves effective).

Again, the third section has similar interesting things to be seen and no doubt so do future sections – if I ever manage to get there. 664 and 6128 owners will be happy to know that the authors have had the good sense to make this game compatible.

Author: Elite.
Price: Cassette £8.95. Disc £14.95.

Colin

This game starts out really easy and seems like the perfect tonic for a real blast fan but the going very quickly becomes quite tough. Even the last screen of the first section took me about 15 minutes to get through. In desperation I had a quick look for an infinite lives poke – I managed to give myself 254 men and 256 grenades to start and this helped, though I still can't get through the screen at the end of the third section.

Without the pokes I could see people becoming rather disillusioned if they never managed to get out of the first section. Having played WDW2 I'm bound to compare the two. For my money the Alligata version has to be better because it doesn't get so difficult quite so soon.

However in that game – with infinite lives – it only took 45 minutes to get to the end of the eighth section, so it might lose its appeal sooner than this version.

18/20

Liz

When I first saw the arcade machine I was underwhelmed by the naff helicopter sprite which drops your man at the start of the mission. Thankfully Elite have not tried to reproduce this – it was a very large sprite and moving it on a 16k screen would have been jolly difficult.

The actual game play is pretty good, following the original quite closely, and as with the Capcom arcade machine gets too difficult too early. The graphics are reasonably good, the sprites smooth and the sound adequate. Most of the excitement comes from blasting as many baddies as quickly as possible.

If Who Dares Wins was more like this than Who Dares Wins II is then all the lawsuit fuss (which caused Who Dares Wins to be withdrawn on the Commodore 64), was justified. It would not be worth buying both. On balance I would say that Commando is the better game. Rambo is sufficiently different to escape the cries of "wadda con", but only just.

15/20

Nigel

I could play Commando for hours. It starts off with lots of action, then there's more action – after a bit more action, you die. The game has just the right amount of difficulty where you are sure that if you just put in a bit more effort, and make a few less mistakes, you can improve your score and make it to the next screen.

My only reservation is that the sprites are a bit flickery and when you die under the bridge it is not clear where you are starting from. I also get very annoyed when I blew myself up with a grenade I didn't intend to throw.

16/20

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BOUNDER



I'm very tempted to start this review by saying "boing, boing, boing", but as that is a bit passé, I won't. Bounder is a cute little game from Gremlin Graphics and the basic idea seems to be original.

You must guide a large orange tennis ball that is bouncing up and down. You see the game as if looking down on the ball from above and as progress is made down the hazardous course the game scrolls vertically over several screens. There are safe areas paved with hexagonal bricks to bounce on and there are deadly areas, which are just about everywhere else.

Along the way, and in addition to the difficulty of just bouncing where you want to, various aliens are moving around. Some are more deadly than others, most are generally unhelpful, but there is a boxing glove that gives you a helping hand to make the final jump to the goal.

Also along the path are bonus areas which give you bonus points or extra lives in most cases, although there are penalties in some cases. Should you complete the course an extra bonus screen appears and more mystery boxes, containing various amounts of bonus points, can be bounced.

Control of the game is a bit tricky to master. Keyboard or a joystick can be used and this gives you control over the direction in which the ball bounces. If there is a large gap between one safe area and another, whether you make it across the gap or not depends on the amount of time the ball is in the air.

Perhaps the most unfair obstacles are the walls. They look just like another type of ground but attempting to cross them brings instant death. There are arrowed areas which give extra big bounds allowing large gaps to be traversed. The trickiest bit seems to be to get the screen to scroll when you want it to, rather than when it causes you to mis-time a bounce.

The graphics are very good with the upper part of the screen in Mode 0, showing the ball growing larger as it comes up toward you and diminishing as it falls earthward.

A status area at the bottom uses a split screen technique to display number of balls left, points and so on in Mode 1. This area includes a screen which displays the bonus points as you land on bonus squares. There is also a record of how many jumps you are allowed when you go into the bonus phase at the end of a successful level. Each unused jump, after you have bounced on all the boxes in the bonus phase, multiply your score.

Author: Gremlin Graphics.
Price: £8.95.

Nigel

This game has a nice quality about it. It is polished and has some humorous touches. I found controlling the ball a bit difficult at first, but I managed to get the hang of it in the end. I like the idea that, to improve your score, you have to learn the course. The best games seem to be those that need some degree of learning.

The game is a bit frustrating in places. One thing I didn't like is the way that, when you lose a life, the new ball appears in a position you don't expect. Your eye tends to stay at the position the ball disappeared, meanwhile you are losing another life on the other side of the screen. Also it took me ages to work out that walls were impassable. Apart from these two minor criticisms, I think the game deserves to be a success.

17/20

Liz

I was surprised by the sheer originality of this game, Gremlin Graphics really have produced a bumper bundle of software. At a time when I was beginning to think that software houses were jumping from one arcade conversion to another or else they were waiting for someone to come up with a semi-original idea so that they could pinch it a smallish software house comes up with something this different. I suppose that this is where I get loads of letters from readers who have seen something similar in the arcades and I missed it.

Right now I'm finished with the heaped praise, on with some comments. I prefer Thing on a Spring. The graphics are better in Bounder, the music every bit as good and the concept totally novel, but I don't think the gameplay is as good. Bounder is good but don't buy it until you've defeated the evil goblin.

15/20

Colin

I don't usually like Mode 0 games – they are far too chunky and anyone with their head screwed on right – your nose should point in the same direction as you walk – will appreciate the square pixels you get in Mode 1 and use stipples to generate the extra colours. Bounder is an exception. The lively colours make this game something special. Gremlin have cheated by only scrolling half the screen – filling the rest with a picture of a tennis ball with arms – but the bit which is scrolled does so very smoothly.

Being a bunch of lazy wimps we got an infinite lives poke but the nice man at Gremlin graphics said that he would exact a horrible punishment on the editor if we let it out. So here it is – while the Ed's not looking. First you . . . oh no here he comes . . . take the bounder tape . . . aaargh . . . and . . . oooh – no that hurts . . . poke . . . yeee ow . . . with no, no, no . . .

16/20

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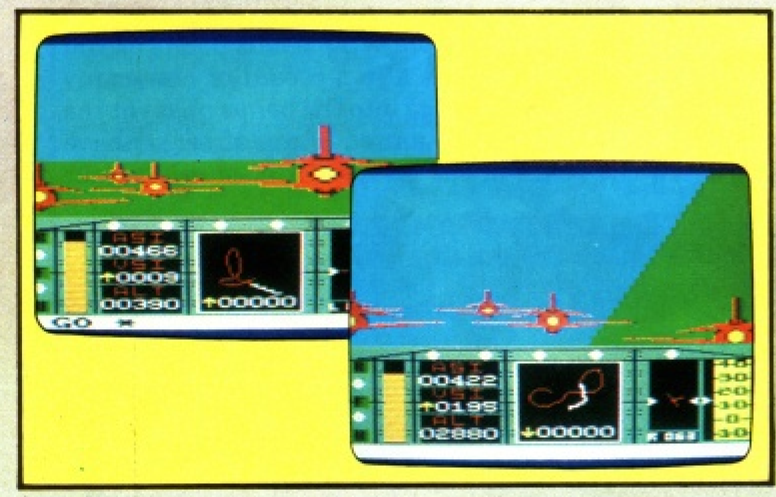
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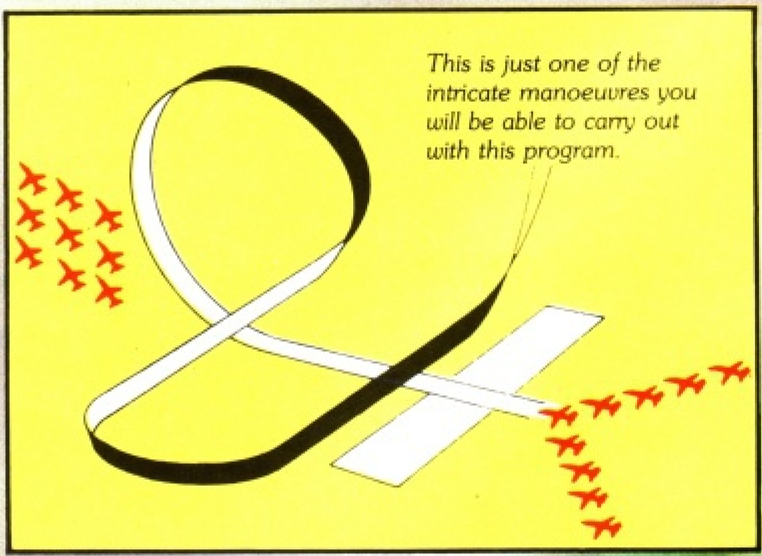
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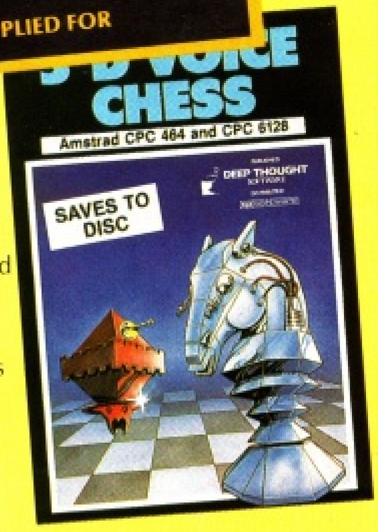
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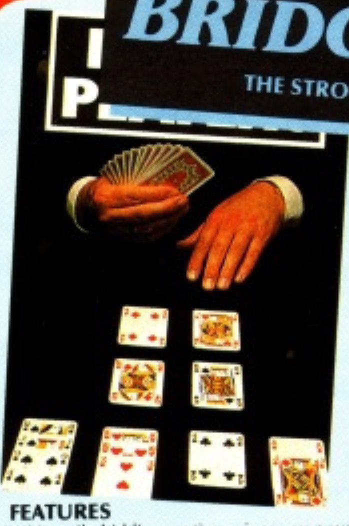
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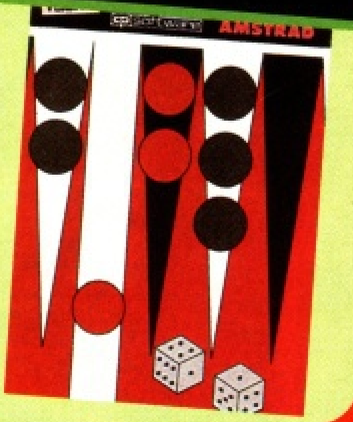


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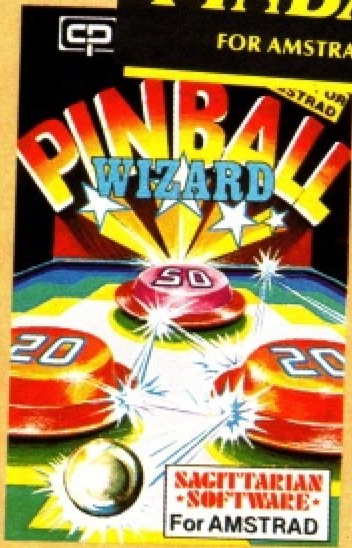
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The Least Significant Bit

The Sinclair sell out

In one pre-emptive swoop, Amstrad has now wrenched the heart of the UK home computer industry from Cambridge and planted it in Brentwood. Some observers had been expecting a move like this for a long time, to others it came as more of a surprise.

The purchase price of £5 million was a snip – but Amstrad wouldn't have had it any other way – and the fact that Amstrad now control some 60 per cent of the market by their own and Sinclair's admission creates a powerful influence that will probably not be referred to the Monopolies Commission, since the deal extricates Sir Clive and his admirers in Downing Street from the embarrassing possibility of yet another overseas sell-off of an ailing UK company.

ADVERTISERS' INDEX

Saved from bridge-it on Spectrum?

Alan Sugar stated categorically that Amstrad would not be branding its own range of Spectrum software, but Amstrad would be operating a screening service to provide a stamp of approval on software that would run on the 48k and 128k editions of the Spectrum.

This is certainly one way around the problems of "badly-behaved" software, but Sinclair has not really produced quite the same set of guidelines that Amstrad managed with the original CPC 464 firmware guide. The task of writing well-behaved software for the Spectrum is thus somewhat more hit and miss – and by now, all the decent stuff perverts all the rules, so operation on the 128k Spectrum seems to be luck of the draw.

Overall the industry will be pleased to know that the scheme is not being operated simply as a means of Amstrad funnelling off the best (best? You must be joking) software to its own private collection.

No QLs please, we're Amstrad

In a carefully measured remark, Alan Sugar laid the QL to rest, commenting that it had not in fact been in production for a long time anyway. Not many of the assembled journalists at the announcement showed any signs of emotion at this remark. There was no wailing or gnashing teeth until the question of Spectrum enhancements were mentioned.

"We might build a cassette or disc drive on to make it easier to use", said the great man.

"And what sort of discs will it use?" asked one brave soul.

"Three inch, of course . . ." flashed the reply. A gasp went up.,

"But it's not the standard", someone complained.

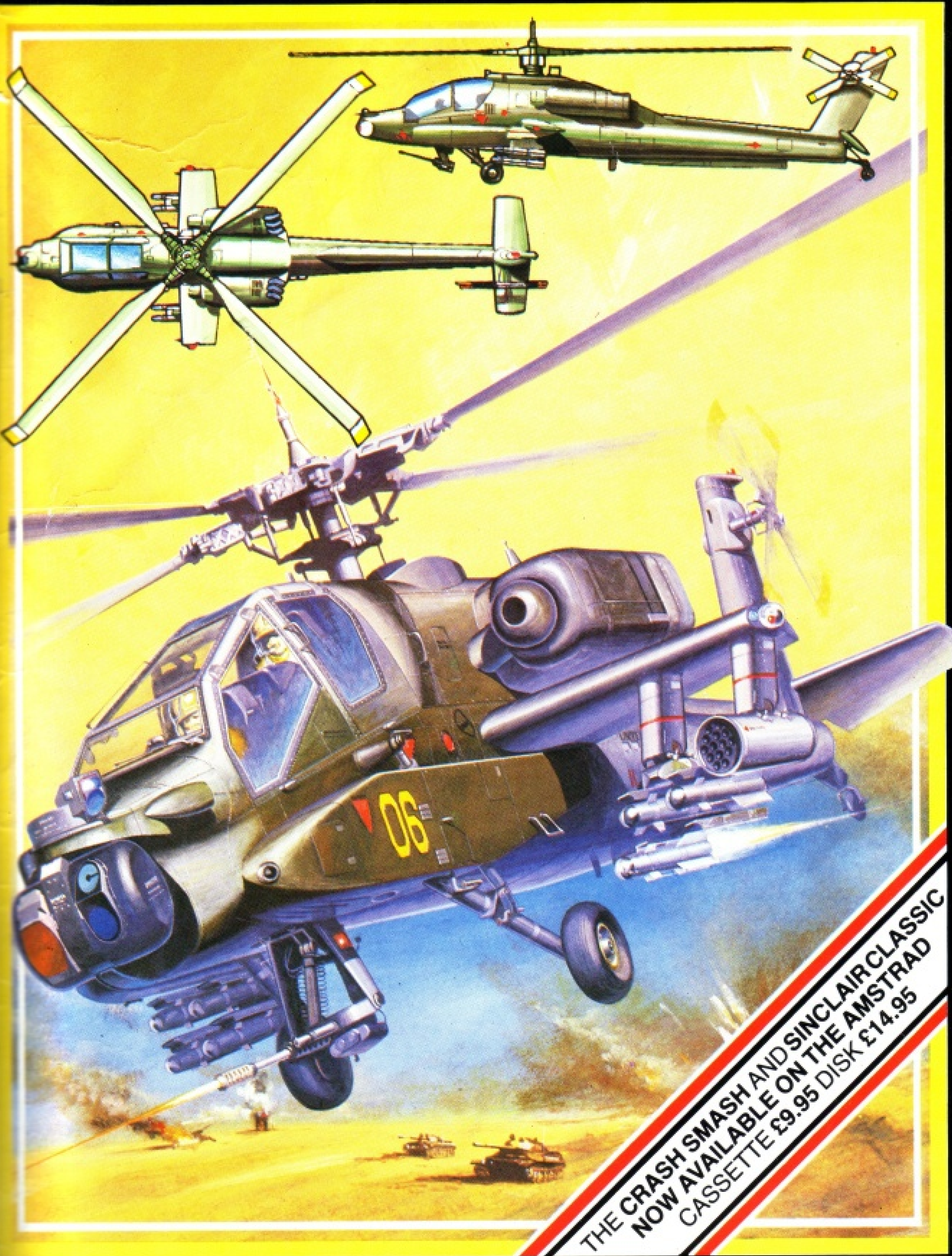
"Of course it's standard", he shot back, "most standard disc system in the world . . .", with an impish grin that will live forever with those of us lucky enough to catch it.

Aha, but what about 5 inch drives? Well, artistic license is permitted, and everyone knows about those anyway, don't they?

This announcement may well provide succour to disc manufacturers trying to decide if they should be preparing to join the fray for 3 inch discs, since the prospect of Spectrum games consoles with built in 3 inch disc drives might well create the surge of interest that they've been waiting for. ACU

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